CONSERVATISM IN CREDIT RATINGS

A COMPARATIVE STUDY OF TIME-VARYING CREDIT RATING STANDARDS IN EUROPE AND THE US, 1997-2023

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Abstract:

Our paper reveals increased conservatism in credit ratings in both Europe and the US from 1997 to 2023, with the effect stabilizing after the financial crisis. On average, ratings have declined by more than three notches in Europe, signifying that a firm rated AAA in 1997, with constant financial characteristics, would receive a rating of AA- in 2023. In the US, the decline amounts to around two notches. Within Europe, the effect is most pronounced in Southern Europe, while Eastern Europe and Eurasia deviate from this pattern of conservatism. Our study does not find compelling evidence that justifies the observed increase in conservatism, as there is no indication of increased default rates in either region. Additionally, we find that firms more affected by rating conservatism are less leveraged and experience lower sales growth.

Keywords:

Credit ratings, rating quality, rating conservatism, rating standards

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1. Introduction

Credit Rating Agencies (CRAs) play a vital role in the efficient functioning of the financial system. The ratings they issue are used by regulators, financial institutions, debt issuers, and investors, and are an important means to reducing information asymmetry between market participants. Despite their essential function, CRAs have faced widespread criticism, particularly regarding the conflict of interest stemming from the fact that the issuers they rate are the ones who pay their fees. Some evidence suggests that agencies might be incentivized to issue overly generous and issuer-friendly ratings in comparison to the actual default risk associated with the securities they rate (see, for example, Becker and Milbourn, 2011; Griffin and Tang, 2012). Following the 2008 financial crisis, CRAs were accused of assigning too optimistic ratings to structured financial products, with some observers arguing that these agencies were the fundamental cause of the crisis (Partnoy, 2009; Benmelech and Dlugosz, 2010).

However, in the examination of corporate credit ratings, research does not seem to support the idea of reduced standards in credit ratings over time. Rather, there is an observable shift toward increased conservatism in the credit rating standards employed by CRAs (Blume, Lim, and MacKinlay, 1998; Alp 2013; Jorion, Shi, and Zhang, 2009; and Baghai, Servaes, and Tamayo, 2014). This implies that when holding firm characteristics constant over time, there is a noticeable decrease in average credit ratings. However, this research has solely focused on US data, prompting exploration into whether a similar trend exists in other geographical markets.

This paper explores the variation in the rating standards used by CRAs for corporate credit ratings in the US and Europe from 1997 until September 2023. Additionally, we examine the consequences of this variation on firms' capital structure decisions and sales growth. The comparison between these two markets is interesting due to their pronounced differences, e.g., in terms of regulation, competition, and maturity (see, for example, Baghai, Becker, and Pitschner, 2022, and Nataf, Moor, and Vanpée, 2018). To the best of our knowledge, our study is the first to investigate the time-series variation in credit rating standards using European data over an extended period. As a result, our contribution lies in uncovering this variation in both the US and Europe over

the years 1997-2023, and its consequential impact on capital structure and sales growth, all while providing a comparative analysis between the two regions.

Our findings suggest a trend of increased conservatism in the assignment of corporate credit ratings, observed both in Europe and the US. This is consistent with previous findings documented in studies employing US data. On average, ratings have declined by more than three notches in Europe since 1997. To illustrate, this implies that a firm rated AAA in 1997, with constant financial characteristics, would be assigned a rating of AA- in 2023. In the US, the decline amounts to approximately two notches. Notably, both regions exhibit the largest increase in conservatism leading up to the financial crisis, followed by stagnation thereafter. Within Europe, Southern Europe emerges as the region with the largest increase in conservatism over the sample period, while Eastern Europe and Eurasia deviate from the pattern of conservatism observed in other European regions.

The observed tightening of credit rating standards could be warranted if macroeconomic changes have caused an increase in default risk, a factor not accounted for in our model. We investigate this possibility by analyzing 5-year cumulative default rates for Europe and the US. Our findings show no indication of increased default rates in either region. In Europe, our findings suggest a decline in default rates among investment-grade entities. Our evidence is consistent with Baghai, Servaes, and Tamayo (2014) who find that the increased stringency does not seem entirely warranted.

To further examine whether the increased conservatism is warranted, we study firms' capital structure decisions. As argued by Baghai, Servaes, and Tamayo (2014), if firms deem the increased stringency as unwarranted, they should exhibit lower leverage over time. To explore this implication, we employ our ratings model over the period 1997 to 2010 to predict ratings spanning 2011 to 2023. Subsequently, we construct a measure of conservatism as defined by the difference between the actual and predicted rating. We find that firms more affected by this conservatism are less leveraged, both in the US and Europe. For every one-notch decrease in actual ratings compared to predicted ratings (e.g., from A+ to A) firms reduce their leverage as a fraction of total assets by 0.8 and 4.9 percentage points depending on region and model specification. Finally, we find that firms more affected by conservatism experience lower sales growth.

The paper proceeds as follows: In Section 2, we discuss the related literature. In Section 3, we describe the data and methodology. In Section 4, we present and discuss our empirical results. In Section 5, we discuss the limitations of our study. Section 6 concludes.

2. Related Literature

2.1 Credit Ratings and Role of CRAs

An issuer credit rating serves as a forward-looking opinion about an obligor's creditworthiness. These credit ratings are determined by a Credit Rating Agency (CRA), employing both public and nonpublic information to assess an entity's long-term and short-term ability to timely meet its financial obligations, such as principal and interest payments on their debts (Standard & Poor's, 2023). In a world characterized by information asymmetries and moral hazard, CRAs play a crucial role in certifying the value of economic entities, ultimately facilitating efficient market pricing (Millon and Thakor, 1985).

Credit ratings influence corporate financing and investment decisions substantially. Higher-rated entities typically secure more favorable financing terms compared to their lower-rated counterparts. Additionally, some investors are required by policy or law to only purchase bonds within or above a certain rating category (e.g., pension funds, money market funds). A credit rating could thus present an issuer with access to a larger and broader pool of investors (Securities and Exchange Commission, 2003).

Moreover, credit ratings serve as a tool to reinforce management responsibility. Following the disclosure of a rating, the CRA continues to monitor the issuer, with the issuer implicitly promising to undertake specific actions to minimize the potential decline in its credit rating (Boot, Milbourn, and Schmeits, 2006). Widely acknowledged as important by legislators, issuers, and investors, credit ratings are crucial for the proper functioning of the financial system, highlighting the importance of high-quality ratings (Becker and Milbourn, 2011; European Commission, 2016; Jackowicz et al., 2020).

2.2 Potential Factors Influencing Rating Accuracy and Quality Across Markets

While high-quality ratings are important to various stakeholders, CRAs face multiple challenges that have the potential to influence the quality of credit ratings across different markets. In the context of studying time-series variation in credit rating standards, we highlight four areas from the literature affecting credit ratings. Those are (1) conflict of interest, (2) reputation, (3) competition, and (4) regulation.

First, the *issuer-paid* model which CRAs predominantly adhere to gives rise to conflicts of interest. Under this model, CRAs charge issuers a fee for providing a credit rating. As issuers benefit from higher ratings, CRAs could potentially gain market share by catering their ratings to the issuers, compromising rating quality and causing rating inflation. Griffin and Tang (2012) present evidence supporting this idea. They observed that, before the 2008 financial crisis, a major credit rating agency often gave higher ratings than what its model suggested. CRAs also provide other services than ratings to issuers, such as pre-rating analyses, assessment of potential transactions, and debt restructuring consulting. Using a sample of Indian firms, Baghai and Becker (2016) find that agencies rate issuers that pay them for these non-rating services higher.

A mitigating factor against conflicts of interest is, however, the *reputation effect.* An issuer's willingness to pay for a rating is dependent on the belief that the rating will positively impact the financing terms of its debt securities in the public market. Therefore, for the rating to hold value, potential investors must be convinced that the rating provides useful information about the entity's creditworthiness. Consequently, CRAs are incentivized to gain a reputation and track record of successful and useful ratings. As Thomas McGuire, a former executive of Moody's, put it: "what's driving us is primarily the issue of preserving our track record. That's our bread and butter" (Becker and Milbourn, 2011). Existing literature has suggested that the reputation effect often outweigh any conflicts of interest (Covitz and Harrison, 2003; Mathis, McAndrews, and Rochet, 2009).

A well-known example of when CRAs suffered significant reputational damage was in the aftermath of the 2008 financial crisis. As the credit derivatives market surged, investors sought structured finance products, such as mortgage-backed securities, without thorough examination of the underlying assets. Instead, investors heavily relied on credit ratings. Those ratings were, however, excessively optimistic as CRAs had

financial incentives to employ inaccurate assumptions and models. Some observers argue that CRAs ultimately caused the crisis (Partnoy, 2009; Benmelech and Dlugosz, 2010).

Similar scandals unfolded during the significant bankruptcies of Enron in 2001, WorldCom in 2002, and Parmalat in 2003, with CRAs failing to predict these financial collapses. In Europe, CRAs faced scrutiny amidst the economic turmoil caused by the 2009-2012 banking and sovereign debt crises, collectively recognized as the Eurozone debt crisis. Most European Union members experienced rising fiscal deficits, prompting credit rating agencies to significantly downgrade sovereign ratings. The countries most severely impacted included Greece, Ireland, Portugal, Spain, Italy, and Cyprus. Notably, Portugal, Greece, and Cyprus saw their government bonds assigned junk status in 2012, despite previously holding A-level or higher ratings before 2009. This once again underscores the failure of financial markets and CRAs to anticipate and reflect pre-crisis risks (Baum, Schäfer, and Stephan, 2016; Wickens, 2016).

A third factor known to impact ratings is *competition* among CRAs. The credit rating industry has long been dominated by a few key players, most prominently Standard & Poor's (S&P), Moody's, and Fitch. While increased competition in the industry has been advocated to promote continued integrity and reliability of ratings, Becker and Milbourn (2011) provide evidence that increased competition in the industry negatively affects the quality of ratings, as measured by both levels and the informational content of ratings. Similarly, Bae, Driss, and Roberts (2019) suggest a significant deterioration in ratings quality in response to increased competition in the Canadian corporate bond rating market. One plausible explanation for this phenomenon is demonstrated by Bar-Isaac and Shapiro (2013) who propose that when competition is higher, reputational losses are lower, leading to reduced incentives for CRAs to provide accurate ratings. Similarly, Baghai and Becker (2020) find that S&P's efforts to regain market share after the financial crisis compelled the agency to compromise ratings quality to attract clients. Their findings suggest that issuing optimistic ratings becomes a strategic move for a CRA with a weakened reputation, aiming to gain market share.

The fourth factor shaping CRAs and credit ratings is *regulation.* Given the significant role of ratings in events such as the global financial crisis, there has been ongoing debate on how to reform and regulate CRAs. According to Nataf, Moor, and Vanpée (2018) the enactment of Regulation (EC) No 1060/2009 in the EU, also referred

to as CRA I, influenced both the assessment of indicators used by CRAs and the magnitudes of up- and downgrades they imposed. In the US, there is evidence that CRAs, after the enactment of the Dodd–Frank Wall Street Reform and Consumer Protection Act (Dodd–Frank) in 2010, incorporate more quantitative information into their rating decisions, leading to an improvement in credit rating quality (Ahmed, Wang, and Xu, 2023). These findings underscore the significance of regulatory frameworks for CRAs and highlight their relevance when examining variations in credit ratings over time and across markets.

2.3 Difference between the Ratings Markets in Europe and the US

The credit ratings markets in Europe and the US have important differences in their market structures, including regulation, competition, and maturity levels in each region. Prior to the financial crisis, the US had a notably effective regulatory framework, whereas the EU had inadequate rules specifically addressing CRAs (Nataf, Moor, and Vanpée, 2018). In the US, the first regulation involving CRAs emerged in the 1930's, prohibiting banks from investing in speculative grade assets. Throughout the century, additional regulations were implemented. However, the regulatory scrutiny of credit ratings faced a resurgence in the early 2000s, notably following the bankruptcies of highly rated companies such as Enron in 2001 and WorldCom in 2002. Subsequently, the Credit Rating Agency Reform Act was introduced in 2006, followed by the Dodd-Frank Act in 2010. These regulatory measures were designed to enhance transparency and accountability among CRAs, ultimately seeking to reduce conflicts of interest and cultivate more accurate and reliable credit ratings (Toscano, 2020).

In contrast, in Europe, the first regulations referencing credit ratings emerged only in 2003, highlighting that ratings should be viewed not as investment recommendations but merely as opinions. The first binding, major regulatory framework was established after the financial crisis in 2009 through Regulation (EC) No 1060/2009, or CRA I. The framework targeted concerns regarding transparency, conflict of interest, and quality. Additionally, the EU assigned a regulatory body called the European Securities and Markets Authority (ESMA) in 2010, responsible for the regulatory oversight and supervision of CRAs. In 2011 and 2013, modifications to the regulations were introduced through CRA II and CRA III. Prior to these regulations, CRAs were

subject only to national regulations and operated under self-regulation, adhering to the International Organization of Securities Commission's (IOSCO) "Code Of Conduct Fundamentals For Credit Rating Agencies" which was established in 2004 (Nataf, Moor, and Vanpée, 2018).

One plausible reason for the US having a longer history of credit rating regulation could be attributed to the maturity of its bond and credit rating market. The US corporate bond market, as a percentage of GDP, is significantly larger than its European counterpart, accounting for 31% of GDP in 2017 compared to 10% in Europe (Baghai, Becker, and Pitschner, 2022). Similarly, in the US, publicly listed firms extensively use bonds, constituting approximately 60% of corporate financing in 2010. In contrast, Europe recorded a figure of approximately 30% for the same year, with bank financing being the most prominent source of financing (Becker and Josephson, 2016).

Nevertheless, the Eurozone bond market has experienced remarkable growth since the year 2000, spurred by the introduction of the Euro currency and further accelerated after the financial crisis. The corporate bond market in the Eurozone nearly doubled in size from €882 billion 2002 to €1.4 trillion in 2018 (Darmouni and Papoutsi, 2022). The number of new companies issuing corporate bonds has also increased, increasing by 53% from an annual average of approximately 258 between 2000 and 2007 to 396 between 2007 and 2018. In contrast, over the same period, the US has maintained a relatively stable average of around 600 new corporate bond issuers per year (Çelik, Demirtaş, and Isaksson, 2019).

Moreover, there is a notable disparity in the utilization of credit ratings between the US and Europe. According to Baghai, Becker, and Pitschner (2023) 94.4% of fixed income funds in the US relied on credit ratings in 2020, up from 90.0% in 2010. In contrast, European fixed income funds only had a 65.8% reliance on credit ratings in 2021. However, the authors find that this number has increased from 46.8% in 2012, suggesting larger and faster growth of the usage of credit ratings in Europe compared with the US during the last decade. With the increase in the number of new corporate bond issuers and the credit rating reliance by fixed income funds in Europe, it is highly likely that the European credit rating market has witnessed substantial growth in recent decades.

In terms of competition, both markets exhibit high concentration among S&P, Moody's, and Fitch ("the big three"). These three agencies collectively held a 93% market share in Europe in 2022, and 94% in the US in 2021 (European Securities and Markets Authority, 2022; Securities and Exchange Commission, February 2023). In the US, there were ten agencies registered as Nationally Recognized Statistical Rating Organizations (NRSROs) in 2022 (Securities and Exchange Commission, October 2023). This figure has increased over the years, evolving from "the big three" in 2000 to five in 2005, nine in 2006 following the Credit Rating Agency Reform Act, and consistently maintaining a range of nine to ten since 2008 (White, 2006; Securities and Exchange Commission, 2023).

In Europe, the landscape is more diverse. Since the introduction of ESMA in 2011, the number of registered CRAs amounted to 22 in 2013, 26 in 2015, and 21 in 2022 (European Securities and Markets Authority, 2013; 2015; 2022). The larger number of smaller agencies in Europe is likely due to the market being more fragmented and different between countries, leading to the emergence of local agencies. The multitude of different countries in Europe also leads to varying market landscapes. For instance, while most European bonds are rated, less than 50% of Nordic bonds are rated (Baghai, Becker, and Pitschner, 2023).

2.4 Empirical Evidence on the Time-series Variation in Rating Standards

Several papers have studied the variation in credit rating standards over time. Blume, Lim, and MacKinlay (1998) suggest that rating agencies have become stringent in assigning ratings to US corporate debt from 1978 through 1995. Alp (2013) finds that credit rating standards have tightened for investment-grade rated firms but have loosened for speculative-grade rated firms in a sample spanning from 1985 to 2002. Baghai, Servaes, and Tamayo (2014) further validate those results as they investigate US ratings spanning the years 1985 to 2009. Their research suggests that, when keeping firm attributes constant, average ratings have experienced a decline of more than three notches. This has important economic implications. A company holding an AAA rating in 1985 would have been downgraded to an AA- rating by 2009, and a BBB-rated firm in 1985 would have seen its investment-grade status vanish two decades later, despite keeping firm characteristics constant.

Additionally, Baghai, Servaes, and Tamayo (2014) examine whether the increased stringency is justified in response to macroeconomic shifts and their impact on default rates. Interestingly, their findings reveal a significant decrease in default rates for both investment-grade and high-yield issuers, suggesting that the increased conservatism is unnecessary and does not correspond to an elevated default risk. Also, they find that this increased conservatism influences firms' capital structure decisions. Firms more affected by stringent rating standards seem to issue less debt, have lower leverage, and hold more cash, possibly indicating that these firms deem the change in rating standards over time as unwarranted. Furthermore, they seem to experience lower sales growth. Capital markets also appear to perceive the conservatism as unwarranted, given that firms suffering more from rating conservatism experience lower spreads compared to less affected firms with the same rating.

While the mentioned studies on credit rating stringency have solely focused on US corporations, few have extended the examination to other markets. Jones, Gwilym, and Mantovan (2022) investigate the effect of the European regulatory reform CRA I on financial institutions. They indeed find an increased credit rating stringency during the sample period 2006 to 2016 and attribute the effect to the increase in regulation. In contrast, our paper focuses on non-financial corporations and spans a significantly longer sample period. To our knowledge, no published papers have investigated credit rating conservatism specifically for European corporations over an extended timeframe, and we are thus the first to do so.

3. Data and Method

3.1 Data

In our study, we employ a panel data set comprising public rated companies in the US and Europe (see Appendix I for the countries included in our sample) spanning from January 1997 to September 2023. We collect data on domestic long-term issuer credit ratings issued by Standard & Poor's (S&P) through the Capital IQ database.

We employ S& P ratings because it offers the most accessible data for our analysis. Those ratings serve as a proxy for all ratings, as ratings assigned by different agencies have been found to be highly correlated (Baghai, Servaes, and Tamayo, 2014).

Additionally, S&P has the highest market share in both Europe and the US at 50%, compared to 32-33% for Moody's and 10-12% for Fitch (European Securities and Markets Authority, 2022; Securities Exchange Commission, 2023).

Table I shows ratings per year for our European sample, while Table II shows ratings per year for our US sample. The samples comprise companies with available data for both ratings and the explanatory variables listed below. For simplicity, we group ratings that include "plus" and "minus" variations with the middle rating. For instance, the AA category encompasses companies rated AA+, AA, and AA-. In both regions, there is a discernible decline in the proportion of firms holding AAA, AA, and A ratings. In Europe, there is a substantial increase in the fraction of firms holding BBB, BB, and B ratings. Meanwhile, in the US, there is an increase in the fraction of firms rated BB. This observed pattern suggests decreased credit rating levels of corporate entities in both regions. This could be explained by deteriorating credit profiles among firms, increased default risk, or as we propose in our paper, increased conservatism among credit rating agencies.

Our financial statement data is sourced from Compustat and is reported on an annual frequency. We exclude financial institutions, utilities, as well as governmental and quasi-governmental firms from our analysis. This exclusion is motivated by the acknowledgment that these entities possess unique characteristics and operate within distinct regulatory environments, potentially posing challenges to drawing generalizable conclusions. As the financial data is reported in local currencies, we convert it to constant 2017 US dollars, mitigating any potential currency or inflation bias. This conversion is conducted using annual currency data from Federal Reserve Economic Data (FRED) and annual inflation data from the World Bank. In the European sample, inflation adjustments are made utilizing the European Union inflation rate.

We incorporate a three-month lag when matching the financial data with credit ratings. This lag is introduced to ensure that the financial information was available to the credit rating agencies at the time when the rating was assigned. Our dataset comprises a single observation per firm-year, which corresponds to the first rating available three months following the fiscal year-end.

Table I

Number Of Companies by Year And S&S Rating Category in Europe

This table displays the temporal distribution of ratings for the European firms in our sample between 1997 and September 2023. The ratings are long-term local currency issuer ratings by S&P and have been sourced from S&P Capital IQ. Ratings that include "plus" and "minus" variations are grouped with the middle rating. For instance, the aa category encompasses companies rated AA+, AA, and AA-.

	Rating								
Year	**AAA**	**AA**	**A**	**BBB**	**BB**	**B**	**CCC**	**CC**	**Total**
1997	1	15	24	8	1	1			50
1998	1	21	32	19	2	3			78
1999	1	19	39	25	5	7		1	97
2000	1	17	45	37	9	10	2		121
2001	1	16	47	60	11	11	4		150
2002	2	10	55	77	18	13	4	2	181
2003	1	9	51	79	32	25	3		200
2004	1	9	57	84	37	33	4		225
2005	1	10	55	89	49	32	3	1	240
2006	1	12	46	103	56	24	3		245
2007	1	11	45	107	56	19	3		242
2008		12	45	106	53	23	4		243
2009		11	42	106	48	29	1	4	241
2010		10	43	106	53	30	2		244
2011		9	44	113	51	36	1	1	255
2012		9	43	112	55	39	4	2	264
2013		10	43	119	57	42	4	1	276
2014		11	42	117	70	45	3	1	289
2015		8	46	125	85	46	4	2	316
2016		7	45	124	88	41	7	2	314
2017		7	43	132	87	42	6	2	319
2018		10	40	143	82	42	7		324
2019		9	46	149	82	42	8		336
2020		7	45	150	87	36	12	1	338
2021		7	47	148	78	31	33	1	345
2022		9	51	147	75	31	6	24	343
2023		9	53	157	71	31	8	2	331
Total	**12**	**294**	**1214**	**2742**	**1398**	**764**	**136**	**47**	**6607**

Table II

Number Of Companies by Year And S&P Rating Category in The Us

This table displays the temporal distribution of ratings for the US firms in our sample between 1997 and September 2023. The ratings are long-term local currency issuer ratings by S&P and have been sourced from S&S Capital IQ. Ratings that include "plus" and "minus" variations are grouped with the middle rating. For instance, the aa category encompasses companies rated AA+, AA, and AA-.

	Rating								
Year	**AAA**	**AA**	**A**	**BBB**	**BB**	**B**	**CCC**	**CC**	**Total**
1997	8	37	129	186	187	161	14	3	725
1998	6	41	124	199	206	212	21	1	810
1999	7	31	116	205	224	227	30	4	844
2000	4	22	112	199	219	231	29	7	823
2001	5	17	100	206	218	213	42	12	813
2002	6	13	90	197	234	202	44	12	798
2003	4	11	86	189	256	210	40	5	801
2004	4	10	85	186	263	232	34	3	817
2005	4	9	81	194	261	237	36	1	823
2006	4	10	67	180	257	243	27	3	791
2007	2	10	59	169	258	242	26	3	769
2008	3	12	51	168	213	253	36	4	740
2009	3	12	55	160	198	226	37	9	700
2010	3	8	60	165	207	242	20	6	711
2011	3	6	59	168	215	228	20	2	701
2012	3	6	57	176	221	220	17	5	705
2013	3	9	58	184	235	203	17	1	710
2014	2	11	54	183	243	220	19	3	735
2015	2	13	44	194	257	206	32	5	753
2016	2	12	38	190	268	166	32	8	716
2017	2	11	37	198	266	179	17	4	714
2018	2	8	37	188	269	168	28	1	701
2019	2	8	40	161	265	169	26	5	676
2020	2	8	34	162	231	173	34	15	659
2021	2	8	33	173	242	197	13		668
2022	3	9	30	182	235	190	17	3	669
2023	1	8	31	182	239	168	27		656
Total	**92**	**360**	**1767**	**4944**	**6387**	**5618**	**735**	**125**	**20028**

3.2 Ratings Regressions

We begin our analysis by estimating regressions on credit ratings. We use the explanatory variables (1) total debt divided by total assets *(Book_Lev)*, (2) cash and short-term investments divided by total assets *(Cash/Assets)*, (3) total debt divided by EBITDA *(Debt/EBITDA)*, (4) interest coverage, measured as EBITDA to interest payments *(IntCov)*, (5) profitability, measured as EBITDA divided by sales *(Profit)*, (6) the log of

the book value of assets, in constant 2017 dollars *(Size)*, (7) tangibility, measured as net property, plant & equipment divided by total assets *(PPE/Assets)*, (8) capital expenditures divided by total assets *(CAPEX/Assets),* and (9) the volatility of profitability *(Vol).* We use these variables not only because they are used in previous literature, but also because they represent many of the factors employed by credit rating agencies (see Standard & Poor's, 2021).

In accordance with Baghai, Servaes, and Tamayo (2014), we incorporate a dummy variable called *Neg. Debt/EBITDA.* This dummy variable assumes a value of one when our *Debt/EBITDA* variable is negative, and zero otherwise. This step is important because while lower ratios of debt to EBITDA mitigate the risk of default, negative values amplify this risk. The dummy variable serves as a vital tool in addressing this discontinuity at zero in our analysis.

Furthermore, we adjust the interest coverage variable for firms with zero interest payments. For these firms, we set the ratio of EBITDA to interest payments equal to the 99th percentile of the distribution. The volatility of profitability is computed using the current year's data as well as the four previous years' data. If there are fewer than two observations available, we mark the variable as missing. We apply winsorization at the 99th percentile to all independent variables, excluding *Size* and *Neg. Debt/EBITDA*. In addition, *Profit*, *IntCov*, and *Volatility* are winsorized at the 1st percentile. Table III provides the annual equally weighted means of the credit rating variable as well as the explanatory variables for our European sample. Table IV offers a similar summary for our US sample. The dependent variable, *Rating* is a numeric representation of credit ratings, where AAA is coded as 1, AA+ as 2, AA as 3, and so on.

For both regions, we observe that average ratings worsen over the sample period. For Europe, they increase from 5.92 (close to A) in 1997 to 9.87 (close to BBB-) in 2023. In the US, the trend is less pronounced, with ratings increasing from 10.38 (close to BBB) in 1997 to 11.74 (close to BB) in 2023. In addition, we note increased interest coverage, profit, and volatility of profitability for both regions, along with a decline in tangibility and capital expenditures. For Europe, there is also a notable increase in the amount of debt to EBITDA, while for the US, we observe an increase in cash holdings and size.

Table III

Summary Statistics: European Ratings Regressions

This table provides annual averages for the variables used in the ratings regressions, on our European sample. The dependent variable, *Rating*, is a numeric representation of credit ratings, where AAA is coded as 1, AA+ as 2, AA as 3, and so on. *Book_Lev* is computed as the ratio of total debt to total assets, *Cash/Assets* denotes cash and cash equivalents relative to total assets, *Debt/EBITDA* signifies the ratio of total debt to EBITDA, *Neg. Debt/EBITDA* is a binary variable set to one if *EBITDA* is negative and zero otherwise, *IntCov* is calculated as EBITDA divided by interest expenses, *Profit* is derived from EBITDA divided by sales, *Size* represents the natural logarithm of the book value of total assets in constant 2017 dollars, *PPE/Assets* indicates net property, plant, and equipment divided by total assets, and *Capex/Assets* denotes capital expenditures divided by total assets. *Vol* measures the volatility of profitability, using data from the current year and the four preceding years; at least two years of data are required for its calculation. In cases where the ratio of total debt to EBITDA is negative, it is set to zero. For companies with zero interest payments, *IntCov* is set to the 99th percentile of its distribution. All explanatory variables, except for *Size* and *Neg. Debt/EBITDA* are subject to winsorization at the 99th percentile. Profitability, interest coverage, and the volatility of profitability are also winsorized at the 1st percentile.

Year	*Rating*	*Book_Lev*	*Cash/ Assets*	*Debt/ EBITDA*	*Neg. Debt/ EBITDA*	*IntCov*	*Profit*	*Size*	*PPE/ Assets*	*Capex/ Assets*	*Vol*
1997	5.920	0.231	0.103	2.120	0.040	10.085	0.170	9.261	0.395	0.074	0.029
1998	6.321	0.282	0.113	2.155	0.026	10.383	0.195	9.326	0.407	0.079	0.032
1999	7.155	0.316	0.095	2.576	0.052	7.592	0.186	9.299	0.425	0.084	0.040
2000	7.826	0.313	0.098	2.966	0.058	8.599	0.175	9.362	0.381	0.074	0.043
2001	8.327	0.299	0.082	3.039	0.040	9.927	0.185	9.316	0.341	0.071	0.043
2002	8.685	0.301	0.074	3.008	0.028	8.714	0.184	9.211	0.360	0.062	0.041
2003	9.150	0.294	0.081	2.952	0.020	8.945	0.187	9.228	0.354	0.054	0.036
2004	9.320	0.304	0.091	2.836	0.013	10.080	0.197	9.175	0.355	0.052	0.034
2005	9.513	0.289	0.095	2.580	0.013	12.551	0.207	9.264	0.350	0.055	0.034
2006	9.482	0.268	0.090	2.270	0.012	13.115	0.214	9.334	0.336	0.057	0.031
2007	9.459	0.263	0.088	2.273	0.008	13.717	0.213	9.372	0.317	0.058	0.029
2008	9.519	0.263	0.084	2.236	0.004	13.031	0.223	9.545	0.315	0.062	0.028
2009	9.784	0.282	0.081	2.509	0.008	12.134	0.214	9.645	0.316	0.061	0.028
2010	9.779	0.288	0.101	3.211	0.012	10.717	0.205	9.576	0.317	0.046	0.029
2011	9.831	0.279	0.105	2.779	0.004	13.477	0.212	9.564	0.299	0.047	0.029
2012	10.008	0.284	0.095	2.636	0.011	13.606	0.214	9.579	0.293	0.050	0.031
2013	9.953	0.285	0.100	2.789	0.007	13.274	0.206	9.458	0.297	0.052	0.029
2014	10.059	0.289	0.101	2.899	0.003	12.713	0.204	9.382	0.307	0.053	0.027
2015	10.263	0.306	0.101	3.085	0.006	12.560	0.205	9.343	0.297	0.050	0.025
2016	10.331	0.305	0.100	3.001	0.010	13.477	0.211	9.217	0.293	0.050	0.027
2017	10.263	0.306	0.099	3.030	0.013	13.844	0.213	9.243	0.284	0.047	0.027
2018	10.164	0.296	0.099	2.853	0.012	14.485	0.214	9.289	0.283	0.047	0.026
2019	10.196	0.305	0.096	3.102	0.003	15.765	0.218	9.360	0.274	0.047	0.025
2020	10.358	0.333	0.097	3.274	0.012	14.486	0.225	9.374	0.301	0.043	0.028
2021	10.696	0.340	0.128	3.977	0.061	13.325	0.207	9.422	0.290	0.037	0.037
2022	10.557	0.308	0.126	3.328	0.035	20.254	0.224	9.528	0.268	0.036	0.041
2023	9.867	0.302	0.114	3.079	0.021	20.042	0.222	9.366	0.246	0.037	0.039
Mean	9.761	0.297	0.099	2.917	0.017	13.397	0.209	9.382	0.309	0.051	0.031

Table IV

Summary Statistics: US Ratings Regressions

This table provides annual averages for the variables used in the ratings regressions, on our US sample. The dependent variable, *Rating*, is a numeric representation of credit ratings, where AAA is coded as 1, AA+ as 2, AA as 3, and so on. *Book_Lev* is computed as the ratio of total debt to total assets, *Cash/Assets* denotes cash and cash equivalents relative to total assets, *Debt/EBITDA* signifies the ratio of total debt to EBITDA, *Neg. Debt/EBITDA* is a binary variable set to one if *EBITDA* is negative and zero otherwise, *IntCov* is calculated as EBITDA divided by interest expenses, *Profit* is derived from EBITDA divided by sales, *Size* represents the natural logarithm of the book value of total assets in constant 2017 dollars, *PPE/Assets* indicates net property, plant, and equipment divided by total assets, and *Capex/Assets* denotes capital expenditures divided by total assets. *Vol* measures the volatility of profitability, using data from the current year and the four preceding years; at least two years of data are required for its calculation. In cases where the ratio of total debt to EBITDA is negative, it is set to zero. For companies with zero interest payments, *IntCov* is set to the 99th percentile of its distribution. All explanatory variables, except for *Size* and *Neg. Debt/EBITDA* are subject to winsorization at the 99th percentile. Profitability, interest coverage, and the volatility of profitability are also winsorized at the 1st percentile.

Year	*Rating*	*Book_Lev*	*Cash/ Assets*	*Debt/ EBITDA*	*Neg. Debt/ EBITDA*	*IntCov*	*Profit*	*Size*	*PPE/ Assets*	*Capex/ Assets*	*Vol*
1997	10.382	0.380	0.060	3.428	0.040	8.932	0.156	7.739	0.398	0.080	0.043
1998	10.706	0.398	0.069	3.418	0.037	9.064	0.167	7.639	0.385	0.082	0.044
1999	11.021	0.426	0.063	3.696	0.064	8.715	0.143	7.670	0.371	0.081	0.054
2000	11.218	0.424	0.065	3.849	0.055	7.200	0.157	7.741	0.359	0.069	0.057
2001	11.439	0.400	0.065	3.426	0.063	7.364	0.159	7.846	0.346	0.067	0.055
2002	11.569	0.389	0.075	3.734	0.059	8.700	0.152	7.833	0.342	0.059	0.051
2003	11.645	0.390	0.083	3.646	0.040	8.913	0.160	7.773	0.346	0.050	0.053
2004	11.681	0.378	0.089	3.841	0.023	9.958	0.163	7.814	0.335	0.047	0.047
2005	11.706	0.365	0.093	3.324	0.015	12.215	0.171	7.887	0.319	0.049	0.042
2006	11.850	0.349	0.092	3.305	0.011	12.684	0.175	7.921	0.311	0.055	0.041
2007	11.939	0.345	0.087	3.116	0.016	13.144	0.178	8.023	0.310	0.059	0.040
2008	12.107	0.362	0.081	3.289	0.031	11.053	0.180	8.155	0.318	0.063	0.039
2009	12.067	0.382	0.085	3.329	0.056	11.087	0.160	8.110	0.331	0.065	0.047
2010	11.916	0.365	0.113	3.538	0.051	10.889	0.161	8.113	0.334	0.044	0.050
2011	11.807	0.355	0.115	3.313	0.024	13.119	0.196	8.195	0.325	0.047	0.051
2012	11.784	0.365	0.100	3.213	0.020	13.261	0.201	8.240	0.322	0.056	0.047
2013	11.652	0.366	0.101	3.448	0.017	12.758	0.196	8.307	0.327	0.062	0.049
2014	11.718	0.373	0.103	3.561	0.020	12.503	0.200	8.332	0.329	0.060	0.048
2015	11.835	0.390	0.098	3.751	0.020	12.257	0.198	8.349	0.320	0.061	0.042
2016	11.804	0.409	0.096	3.587	0.059	10.836	0.173	8.390	0.311	0.055	0.059
2017	11.634	0.410	0.100	3.932	0.041	9.901	0.186	8.426	0.311	0.048	0.062
2018	11.675	0.400	0.099	3.847	0.003	9.915	0.214	8.467	0.303	0.048	0.060
2019	11.833	0.401	0.088	3.559	0.006	9.916	0.215	8.494	0.292	0.048	0.056
2020	12.082	0.423	0.088	4.114	0.017	8.987	0.196	8.582	0.314	0.044	0.049
2021	11.749	0.421	0.121	4.480	0.090	8.979	0.162	8.601	0.295	0.032	0.059
2022	11.753	0.407	0.109	4.154	0.031	13.216	0.208	8.625	0.284	0.035	0.059
2023	11.738	0.408	0.093	3.875	0.024	13.393	0.215	8.591	0.292	0.042	0.060
Mean	11.629	0.388	0.089	3.613	0.035	10.646	0.178	8.122	0.328	0.056	0.050

For our regressions, we use Ordinary Least Squares (OLS). Year dummies are employed to capture the possible change of ratings conservatism over time. The 1997 indicator is omitted; therefore, the year dummies capture the increase in the rating variable (reflecting a decline in credit rating quality) relative to that year. Additionally, we employ different combinations of industry, country, and firm fixed effects in our regressions. This allows us to control for the unobserved sector-specific, country-level, and individual firm variations. Rating agencies emphasize that ratings, apart from the financial models, also incorporate qualitative criteria that remain unobservable to us (Baghai, Servaes, and Tamayo, 2014). Including firm fixed effects assumes that any unobservable firm-specific factors remain constant throughout the sample period.

We double-cluster our standard errors at the year and firm level to ensure robustness towards heteroscedasticity and autocorrelation. The industry fixed effects are specified at the three-digit SIC (Standard Industrial Classification) code level, sourced from historical SIC codes found in Compustat. In cases where historical SIC codes are unavailable, we substitute the missing data by backfilling with the first available SIC code. If no historical SIC code is present in Compustat, we manually input the information.

To identify regional patterns of credit rating standards in Europe, we categorize the European sample into four distinct subsamples: Northern Europe, Western Europe, Southern Europe, and Eastern Europe and Eurasia. Our selection of countries for each region is primarily guided by geography, with additional consideration of cultural and political factors. For a detailed breakdown of the countries included in each region, see Appendix I. To address the limited number of observations and firms in the initial period of the regional subsamples, data before 2003 is excluded. Therefore, our analysis focuses exclusively on conservatism between the years 2003 and 2023 for these regressions. Summary statistics for each European region are available in Appendix II.

3.3 Default Rates

To address trends in default rates over time, we collect data on corporate default rates categorized by investment-grade and speculative-grade categories from S&P. The data is based on both their public and confidential issuer credit ratings on both nonfinancial and financial companies. Following Baghai, Servaes, and Tamayo (2014), we use the

cumulative five-year issuer default rates. This involves tracking the cohorts rated investment-grade or speculative-grade in a certain year and subsequently observing their cumulative default rates five years later. Our analysis starts with cohorts originating in 1997 and is concluded at the latest available data point for the five-year default rate, which is in 2017.

To test the statistical significance of the default rates, we conduct a time series regression of the 5-year cumulative default rates over our sample period (1997-2017), with a linear time trend variable as a key explanatory factor. This *Linear Trend* variable takes the value 0 in 1997, 1 in 1998, 2 in 1999, and so on. Further, we create a *Recession Exposure* variable with the fraction of recession months faced by the firms over the five-year period. This is aimed at controlling for the fact that defaults are more frequent during recessions. Data on recession months is collected from the Federal Reserve Bank of St. Louis, encompassing indicators provided by the NBER for the US and the OECD for Europe. We report Newey-West standard errors for this regression, using four lags. This accounts for the overlap in default rates among consecutive cohorts.

3.4 Capital Structure and Cash Holdings

Next, we investigate whether the increased conservatism has affected firms' capital structure decisions, following the method of Baghai, Servaes and Tamayo (2014). We begin to construct a measure of conservatism by first estimating the ratings model over the years 1997-2010, hereinafter denoted as the "old model". Subsequently, we use the firms' financial data to predict their credit ratings for each year between 2011-2023 using the coefficients derived from the old model. Predicted ratings below 1 (AAA) are adjusted to 1, while predicted ratings above 21 (C) are capped at 21. Within this range, predicted ratings are treated as continuous variables and are not rounded. Conservatism is defined as the difference between the firm's actual rating and its predicted rating. Hence, for each firm *i* and each year *t*, from 2011 onward, we calculate

$$Rat\_Diff_{i,t} = Actual\ Firm\ Rating_{i,t} - \ Predicted\ Firm\ Rating_{i,t,1997-2010}$$

For both Europe and the US, we estimate the predicted firm rating using two OLS regression models. First, we apply models incorporating industry fixed effects and, for Europe, also include country fixed effects. Second, we apply models including firm fixed effects. This results in two measures of conservatism, namely Rat_Diff_{ic} and

Rat_Diff_f. In the case of the US regressions, the country dummies are omitted, therefore Rat_Diff_{ic} becomes Rat_Diff_i[1]. To compute Rat_Diff_{ic}, we consider only observations from countries and industries present in the 1997-2010 model. Similarly, when calculating Rat_Diff_f, we exclude firms that are not part of the old model. As a result, the sample used for calculating Rat_Diff_f is smaller than the one used for Rat_Diff_{ic}.

Annual equally weighted averages for the Rat_Diff variables are reported in Table V for Europe and VI for the US. While their means are positive, they are decreasing over time except for Rat_Diff_i in the US. This contrasts with the findings of Baghai, Servaes, and Tamayo (2014) who find exclusively increasing differences between predicted and actual ratings over the period 1997-2007 in the US. A possible explanation to this discrepancy may be that conservatism have been more pronounced prior to the financial crisis.

To examine the influence of rating conservatism on firms' capital structure decisions, we conduct two sets of OLS regression models for Europe and the US during the sample period 2011-2023. The first set of models study *debt issuance*, employing the dependent variable long-term net debt issues divided by total assets. The second set of models study *debt levels* by separately considering two dependent variables: (1) total debt divided by total assets *(Book_Lev)*, and (2) the ratio of long-term debt to total assets *(Ltde/Assets)*. The annual averages of the variables are reported in Table V for Europe and Table VI for the US. Summary statistics for *Book_Lev* are reported in Table III and IV.

We use the independent variables utilized by Baghai, Servaes, and Tamayo (2014), except for those where a notable fraction of firms in our sample report missing values. The variables in focus are our measures of rating conservatism, Rat_Diff_{ic} and Rat_Diff_f. The control variables are (1) the log of the book value of assets, in constant 2017 dollars *(Size),* (2) profitability, measured as EBITDA divided by sales *(Profit),* (3) tangibility, measured as net property, plant & equipment divided by total assets *(PPE/Assets),* (4) R&D expenses divided by sales (*R&D/Sales*), (5) the firm's actual

[1] For simplicity, we refer to this variable as Rat_Diff_{ic} even though it is estimated with only industry fixed effects for the US sample.

rating (*Rating*). *R&D/Sales* serves as a proxy for asset uniqueness, growth opportunities, and asymmetric information. Moreover, including the firm's actual rating allows for an assessment of the impact of rating conservatism on capital structure independent of the rating level. This addition also alleviates concerns about the rating conservatism variable potentially acting as a proxy for an omitted variable in the ratings model, given that the firm's actual rating encompasses all the information considered by rating agencies. All regressions on debt issuance and debt levels include industry dummies based on historical three-digit SIC codes and, for Europe, country dummies[2].

In the regression models with long-term net debt issues divided by total assets (*Ltde/Assets)*, we also include the level of debt *(Book_Lev)* as a control variable. We also introduce a lag of one year for the control variables and a lag of two years for the rating conservatism variables in these regressions, aiming to address endogeneity concerns. Conversely, in the regression models with debt levels (*Book_Lev* and *Ltde/Assets*), the control variables are measured contemporaneously, while the rating conservatism variables are lagged by one year. The introduction of lags serves to mitigate endogeneity concerns arising from the potential mutual influence between a firm's rating and its leverage, as both variables are interrelated. Measuring conservatism and leverage contemporaneously could pose challenges in establishing a clear causal relationship between the variables.

Next, we explore whether rating conservatism has impacted cash holdings. Following the method of Baghai, Servaes, and Tamayo (2014), we estimate regressions of the ratio of cash to total assets, as a function of conservatism and control variables. As in our capital structure regressions, the independent variables in focus are our measures of rating conservatism, Rat_Diff_{ic} and Rat_Diff_{f}. The control variables are the same as in our capital structure regressions, but we also add (1) the volatility of profitability *(Vol)*, (2), net working capital over total assets *(NWC/Assets)*, and (3) a dummy variable that takes a value of one in years in which a firm pays a common dividend, and zero otherwise *(Div_ Dummy).* We also include country and industry dummies[2]. Summary statistics on

[2] The findings in the regressions for leverage, cash holdings, and sales growth persist even when estimating these models with firm fixed effects, indicating that our results are not influenced by unobserved time-invariant firm characteristics.

Table V

Summary Statistics for Capital Structure, Cash Holdings and Sales Growth Regressions, Europe

This table shows annual averages of the variables used in the capital structure, cash holdings, and sales growth regressions for the European sample. Variables not displayed here are found in Table III. $\boldsymbol{Rat\_Diff_{ic}}$ is the difference between the actual rating as determined by Standard and Poor's and the rating predicted by regression model (1) in Table VII (excluding year dummies); the credit ratings regression is estimated using data from 1997 to 2010, and the predicted rating is obtained for 2011 to September 2023; $\boldsymbol{Rat\_Diff_{f}}$ is derived from regression (4) in Table VII (excluding year dummies) and calculated using the same method. *Net Debt Issues* are long-term debt issues minus long-term debt reductions, divided by total assets. *Ltde/Assets* is long-term debt divided by total assets. *R&D/Sales* is the ratio of R&D expenditures to total assets. Missing R&D values are set to zero. *Sales Growth* is the difference in sales between year $\boldsymbol{t}$ and $\boldsymbol{t-1}$, divided by sales in year $\boldsymbol{t-1}$. *CAPEX/Sales* is capital expenditures divided by sales. *NWC/Assets* is net working capital less cash divided by assets. *Div. Dummy* equals one in years which a firm pays a common dividend and zero otherwise. All explanatory variables (except $\boldsymbol{Rat\_Diff_{ic}}$, $\boldsymbol{Rat\_Diff_{f}}$, and Div. Dummy) are winsorized at the 99th percentile. *Net Debt Issues*, *NWC/Assets*, and *Sales Growth* are also winsorized at the 1st percentile.

Year	*Rat_Diff$_{ic}$*	*Rat_Diff$_{f}$*	*Net Debt Issues*	*Ltde /Assets*	*R&D/Sales*	*Sales Growth*	*CAPEX/ Sales*	*NWC/ Assets*	*Div. Dummy*
2011	0.656	0.268	-0.007	0.248	0.018	0.086	0.079	-0.023	0.537
2012	0.869	0.421	0.008	0.252	0.019	0.094	0.084	-0.028	0.519
2013	0.542	0.225	0.009	0.254	0.018	0.038	0.086	-0.023	0.482
2014	0.514	0.129	0.009	0.259	0.016	-0.003	0.090	-0.025	0.450
2015	0.641	0.124	0.017	0.272	0.017	0.022	0.085	-0.025	0.478
2016	0.574	0.085	0.010	0.274	0.018	0.043	0.088	-0.037	0.481
2017	0.542	0.023	0.015	0.275	0.020	0.023	0.091	-0.034	0.480
2018	0.560	-0.042	0.006	0.265	0.020	0.088	0.084	-0.033	0.494
2019	0.649	0.040	0.021	0.275	0.020	0.068	0.081	-0.030	0.506
2020	0.739	0.333	0.054	0.304	0.022	0.042	0.081	-0.037	0.405
2021	0.659	0.653	0.018	0.311	0.025	-0.088	0.081	-0.050	0.371
2022	1.034	0.796	0.007	0.284	0.025	0.179	0.073	-0.039	0.446
2023	0.545	0.131	0.009	0.274	0.025	0.232	0.070	-0.036	0.489
Mean	0.657	0.240	0.014	0.274	0.020	0.064	0.082	-0.033	0.470

the control variables are reported in Table V for the Europe and Table VI for the US (unless already reported in Table III or Table IV).

Table VI

Summary Statistics for Capital Structure, Cash Holdings and Sales Growth Regressions, USA

This table shows annual averages of the variables used in the capital structure, cash holdings, and sales growth regressions for the US sample. Variables not displayed here are found in Table IV. $\boldsymbol{Rat\_Diff_i}$ is the difference between the actual rating as determined by Standard and Poor's and the rating predicted by regression model (2) in Table VII (excluding year dummies); the credit ratings regression is estimated using data from 1997 to 2010, and the predicted rating is obtained for 2011 to September 2023; $\boldsymbol{Rat\_Diff_f}$ is derived from regression (5) in Table VII (excluding year dummies) and calculated using the same method. *Net Debt Issues* are long-term debt issues minus long-term debt reductions, divided by total assets. *Ltde/Assets* is long-term debt divided by total assets. *R&D/Sales* is the ratio of R&D expenditures to total assets. Missing R&D values are set to zero. *Sales Growth* is the difference in sales between year $\boldsymbol{t}$ and $\boldsymbol{t-1}$, divided by sales in year $\boldsymbol{t-1}$. *CAPEX/Sales* is capital expenditures divided by sales. *NWC/Assets* is net working capital less cash divided by assets. *Div. Dummy* equals one in years which a firm pays a common dividend and zero otherwise. All explanatory variables (except $\boldsymbol{Rat\_Diff_{ic}}$, $\boldsymbol{Rat\_Diff_f}$, and Div. Dummy) are winsorized at the 99th percentile. *Net Debt Issues*, *NWC/Assets*, and *Sales Growth* are also winsorized at the 1st percentile.

Year	*Rat_Diff$_i$*	*Rat_Diff$_f$*	*Net Debt Issues*	*Ltde /Assets*	*R&D/Sales*	*Sales Growth*	*CAPEX/ Sales*	*NWC/ Assets*	*Div. Dummy*
2011	0.660	0.162	0.019	0.347	0.017	0.125	0.097	0.056	0.464
2012	0.815	0.234	0.035	0.355	0.017	0.146	0.113	0.061	0.489
2013	0.694	0.088	0.041	0.358	0.018	0.062	0.147	0.064	0.528
2014	0.733	0.036	0.036	0.364	0.019	0.074	0.146	0.060	0.541
2015	0.838	0.094	0.048	0.380	0.020	0.101	0.138	0.059	0.551
2016	0.704	0.081	0.038	0.399	0.022	0.009	0.125	0.053	0.571
2017	0.488	-0.165	0.027	0.401	0.024	0.029	0.117	0.047	0.543
2018	0.739	-0.039	0.027	0.391	0.024	0.139	0.110	0.048	0.546
2019	1.043	0.145	0.020	0.391	0.025	0.119	0.099	0.047	0.568
2020	1.223	0.182	0.057	0.412	0.026	0.046	0.089	0.030	0.566
2021	0.522	-0.409	0.025	0.416	0.030	-0.052	0.073	0.023	0.539
2022	0.927	-0.219	0.022	0.402	0.031	0.258	0.067	0.026	0.519
2023	1.002	-0.153	0.017	0.402	0.030	0.187	0.073	0.034	0.537
Mean	0.795	0.033	0.032	0.385	0.023	0.095	0.108	0.047	0.536

3.5 Growth and Investment

Finally, we investigate the impact of credit rating conservatism on firms' sales growth rates. We calculate *Sales Growth* as the difference between sales at time t and $t-1$, divided by sales at time $t-1$. We estimate OLS regression models as a function of conservatism and additional control variables. As in the capital structure and cash regressions, the independent variables in focus are our measures of rating conservatism, Rat_Diff_{ic} and Rat_Diff_f. The control variables are (1) the log of the book value of assets, in constant 2017 dollars *(Size),* (2) profitability, measured as EBITDA divided by sales *(Profit),* (3) total debt divided by total assets *(Book_Lev)*, and (4) the firm's actual

rating (*Rating*). All explanatory variables are lagged one year, except for our Rat_Diff variables which are lagged two years, to alleviate endogeneity concerns. Summary statistics for *Sales Growth*, Rat_Diff_{ic} and Rat_Diff_{f} are presented in Table V for Europe and Table VI för the US. Summary statistics for the control variables are presented in Table III for Europe and Table IV for the US. We can see that growth has been positive in both Europe and the US in all consecutive years, except for 2021 which recorded negative growth. The mean annual sales growth in Europe is 6.4%, while the US exhibits an annual mean of 9.5%.

4. Empirical Results

4.1 Ratings Regressions - Europe and USA

Table VII presents the results from our OLS regressions on European and US credit ratings data over the sample period 1997 to 2023. Models (1) and (3) include, in addition to the explanatory variables as described above, industry and country fixed effects. Model (2) includes only industry fixed effects, excluding country fixed effects, as it is based solely on US data. Models (4) through (6) are estimated with firm fixed effects. In models (1) through (6), we double-cluster standard errors at the firm and year level to account for heteroskedasticity and autocorrelation.

We first run regressions on European data exclusively using model (1) and model (4). We find that eight out of the ten explanatory variables, apart from the year dummies, are statistically significant in both models and exhibit the expected signs. More specifically, the results suggest that firms with high leverage and high interest rate costs have lower credit ratings, as measured by *Book_Lev*, *Debt/EBITDA*, and *IntCov*. Furthermore, firms seem to have higher credit ratings when they hold more cash, have high profits, are large, and have high capital expenditures, as indicated by *Cash/Assets*, *Profit*, *Size*, and *CAPEX/Assets*. In model (1), the variable *Volatility* is positive and significant, indicating that firms with more volatile profits have lower credit ratings. However, in model (4) with firm fixed effects this variable is positive but insignificant. The variable *PPE/Assets* is significant in model (4) with a negative sign, implying that firms with higher tangibility generally have a higher credit rating. The results we focus on, however, are the estimates of the year dummy variables. In Europe, we find that the

Table VII

Ratings Models

This table presents coefficients for OLS regression models of credit ratings in Europe and the US from 1997 to September 2023. Model (1) includes industry and country dummies; model (2) includes industry dummies; model (3) includes industry and country dummies; models (4) through (6) include firm dummies. Explanatory variables are described in Table III and Table IV. Standard errors are double clustered at the firm and year level to account for heteroskedasticity and autocorrelation. P-values are shown in brackets.

	(1)	(2)	(3)	(4)	(5)	(6)
	Europe	USA	Europe and USA	Europe	USA	Europe and USA
Book_Lev	2.475 (<0.001)	1.726 (<0.001)	1.735 (<0.001)	2.471 (<0.001)	1.612 (<0.001)	1.673 (<0.001)
Cash/Assets	-1.320 (<0.001)	-1.166 (<0.001)	-1.354 (<0.001)	-1.525 (<0.001)	-0.857 (<0.001)	-1.063 (<0.001)
Debt/EBITDA	0.201 (<0.001)	0.219 (<0.001)	0.219 (<0.001)	0.125 (<0.001)	0.111 (<0.001)	0.115 (<0.001)
Neg. Debt/ EBITDA	1.543 (<0.001)	2.180 (<0.001)	2.100 (<0.001)	1.273 (<0.001)	0.970 (<0.001)	1.092 (<0.001)
IntCov	-0.018 (<0.001)	-0.019 (<0.001)	-0.020 (<0.001)	-0.011(<0.001)	-0.009 (<0.001)	-0.009 (<0.001)
Profit	-3.742 (<0.001)	-1.027 (<0.001)	-1.488 (<0.001)	-1.795 (<0.001)	-1.585 (<0.001)	-1.505 (<0.001)
Size	-1.319 (<0.001)	-1.323 (<0.001)	-1.307 (<0.001)	-0.946 (<0.001)	-0.829 (<0.001)	-0.873 (<0.001)
PPE/Assets	0.182 (0.387)	-0.494 (<0.001)	-0.462 (<0.001)	-0.884 (0.001)	0.120 (0.428)	-0.367 (0.005)
CAPEX/Assets	-8.576 (<0.001)	-2.045 (<0.001)	-2.959 (<0.001)	-5.920 (<0.001)	-2.840 (<0.001)	-3.160 (<0.001)
Volatility	3.452 (<0.001)	1.961 (<0.001)	2.106 (<0.001)	1.133 (0.112)	0.137 (0.402)	0.126 (0.435)
1998	0.484 (0.131)	0.171 (0.078)	0.175 (0.063)	0.092 (0.699)	0.067 (0.303)	0.054 (0.394)
1999	0.824 (0.008)	0.316 (0.001)	0.314 (<0.001)	0.309 (0.179)	0.170 (0.010)	0.160 (0.013)
2000	1.432 (<0.001)	0.578 (<0.001)	0.603 (<0.001)	0.691 (0.002)	0.408 (<0.001)	0.406 (<0.001)
2001	1.895 (<0.001)	1.081 (<0.001)	1.069 (<0.001)	1.156 (<0.001)	0.829 (<0.001)	0.825 (<0.001)
2002	2.005 (<0.001)	1.165 (<0.001)	1.141 (<0.001)	1.447 (<0.001)	1.018 (<0.001)	1.029 (<0.001)
2003	2.455 (<0.001)	1.250 (<0.001)	1.298 (<0.001)	1.878 (<0.001)	1.107 (<0.001)	1.187 (<0.001)
2004	2.640 (<0.001)	1.392 (<0.001)	1.448 (<0.001)	2.026 (<0.001)	1.223 (<0.001)	1.306 (<0.001)
2005	3.122 (<0.001)	1.727 (<0.001)	1.811 (<0.001)	2.369 (<0.001)	1.491 (<0.001)	1.588 (<0.001)
2006	3.325 (<0.001)	1.981 (<0.001)	2.050 (<0.001)	2.504 (<0.001)	1.690 (<0.001)	1.770 (<0.001)
2007	3.311 (<0.001)	2.235 (<0.001)	2.240 (<0.001)	2.449 (<0.001)	1.905 (<0.001)	1.923 (<0.001)
2008	3.644 (<0.001)	2.423 (<0.001)	2.451 (<0.001)	2.704 (<0.001)	2.157 (<0.001)	2.172 (<0.001)
2009	3.879 (<0.001)	2.214 (<0.001)	2.360 (<0.001)	2.980 (<0.001)	2.043 (<0.001)	2.162 (<0.001)
2010	3.460 (<0.001)	2.017 (<0.001)	2.109 (<0.001)	2.723 (<0.001)	1.799 (<0.001)	1.928 (<0.001)
2011	3.777 (<0.001)	2.213 (<0.001)	2.348 (<0.001)	2.864 (<0.001)	1.856 (<0.001)	2.003 (<0.001)
2012	3.964 (<0.001)	2.316 (<0.001)	2.471 (<0.001)	3.033 (<0.001)	1.934 (<0.001)	2.107 (<0.001)
2013	3.675 (<0.001)	2.193 (<0.001)	2.299 (<0.001)	2.813 (<0.001)	1.813 (<0.001)	1.962 (<0.001)
2014	3.610 (<0.001)	2.251 (<0.001)	2.322 (<0.001)	2.738 (<0.001)	1.781 (<0.001)	1.916 (<0.001)
2015	3.718 (<0.001)	2.327 (<0.001)	2.407 (<0.001)	2.756 (<0.001)	1.879 (<0.001)	1.994 (<0.001)
2016	3.663 (<0.001)	2.203 (<0.001)	2.286 (<0.001)	2.736 (<0.001)	1.832 (<0.001)	1.954 (<0.001)
2017	3.646 (<0.001)	2.032 (<0.001)	2.161 (<0.001)	2.707 (<0.001)	1.657 (<0.001)	1.828 (<0.001)
2018	3.662 (<0.001)	2.281 (<0.001)	2.346 (<0.001)	2.755 (<0.001)	1.828 (<0.001)	1.964 (<0.001)
2019	3.830 (<0.001)	2.553 (<0.001)	2.581 (<0.001)	2.908 (<0.001)	2.024 (<0.001)	2.147 (<0.001)
2020	3.884 (<0.001)	2.738 (<0.001)	2.723 (<0.001)	3.062 (<0.001)	2.184 (<0.001)	2.321 (<0.001)
2021	3.917 (<0.001)	2.169 (<0.001)	2.365 (<0.001)	3.286 (<0.001)	1.714 (<0.001)	2.106 (<0.001)
2022	4.387 (<0.001)	2.549 (<0.001)	2.771 (<0.001)	3.627 (<0.001)	1.944 (<0.001)	2.367 (<0.001)
2023	3.787 (<0.001)	2.551 (<0.001)	2.568 (<0.001)	3.095 (<0.001)	1.920 (<0.001)	2.167 (<0.001)
Country Dummies	Y	N	Y	N	N	N
Industry Dummies	Y	Y	Y	N	N	N

Firm Dummies	N	N	N	Y	Y	Y
Observations	6607	20028	26636	6607	20028	26636
Number of firms	641	2382	3023	641	2382	3023
Adj. $\boldsymbol{R^2}$	0.719	0.676	0.686	0.856	0.868	0.871

year dummies are positive and statistically significant, except for the early years 1998 and 1999. They consistently increase over time, indicating a notable rise in rating conservatism throughout the sample period. Specifically, our findings suggest that European credit ratings have experienced a decline of more than three notches since 1997. That is, a firm that was rated AAA in 1997 would, on average, be rated AA- in 2023, etc.

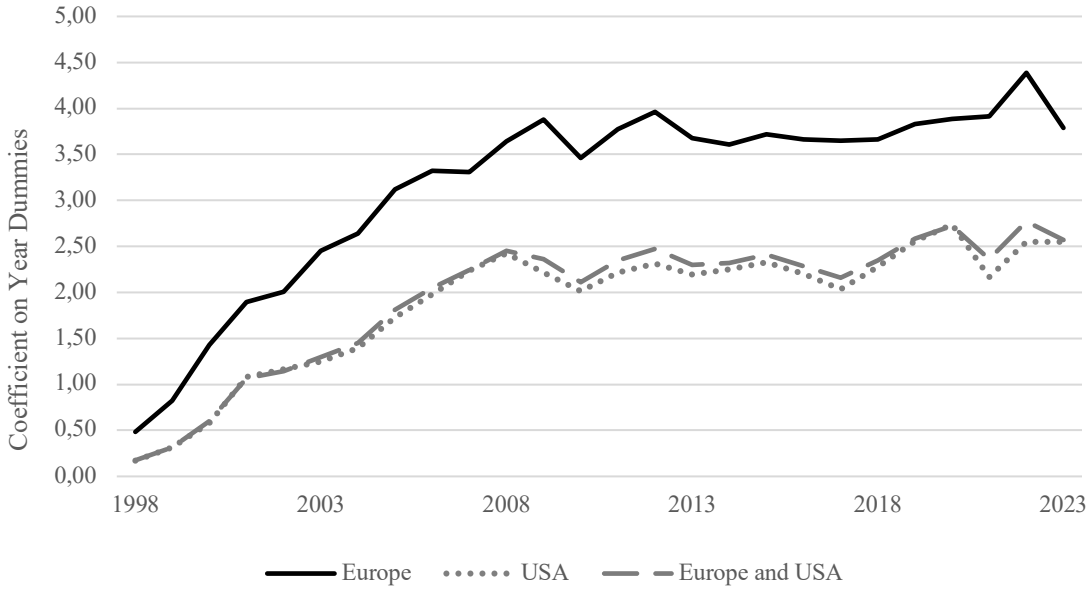
In models (2) and (5), we run regressions on US data. Eight out of the ten explanatory variables are statistically significant in both models and have the same signs as the results observed in the European sample. The variables *PPE/Assets* and *Volatility* are significant solely in model (2) with industry fixed effects, with the same signs identified in the European sample. We find that year dummy variables are positive and increasing over time, in line with Baghai, Servaes, and Tamayo (2014) and the results on the European sample. The year dummies in model (2) indicate that ratings have dropped by almost three notches and approximately two notches in model (5). Model (3) and (6) are OLS regressions conducted on the combined European and US datasets. The results closely align with the patterns observed in the other regressions. All explanatory variables are statistically significant with the expected sign, except for *Volatility* in model (6) with firm dummies, which is insignificant. The year variables again indicate increasing rating stringency.

In Figure I, the coefficients of the year dummies from model (1) through (3) are plotted. The figure suggests that European firms experienced a larger increase in rating stringency across the sample period, compared to the US. Both in the US and Europe, rating stringency appears to have increased the most leading up to 2009, coinciding with the end of the financial crisis, and then leveling off thereafter.

The increased stringency evident in regressions (1) through (6) in Table V may, in part, be attributed to regulations implemented in both regions throughout our sample period. In 2004, the voluntary IOSCO Code was established in the EU, followed by the first binding regulations at EU level through CRA I in 2009, and followed up by CRA II and III in 2011 and 2013, respectively. These regulations aimed at fostering

Figure I
Coefficient on Year Dummies, Europe and USA

Figure I shows the coefficients of the year dummies from OLS regression models (1) to (3) from Table VII on US and European credit rating data between 1997 and September 2023.



integrity and quality of ratings, which may have led agencies to adjust their ratings model or adhere more strictly to it, thus becoming more conservative. This is in line with Jones, Gwilym, and Mantovan (2022), who find that European ratings on financial institutions are lower after the 2011 implementation of CRA II compared to the previous period 2006 to 2011.

Similarly, the increased conservatism after 2006 in the US may be due to the Credit Rating Agency Reform Act in 2006, followed by the Dodd-Frank Act in 2010. This is in line with Ahmed, Wang, and Xu (2023) who find that ratings are of higher quality after the Dodd-Frank Act. In addition to the regulatory changes, the increased scrutiny of the CRAs following the Enron, WorldCom, and Parmalat scandals in 2001, 2002, and 2003, respectively, could have motivated them to take extra measures to safeguard their reputation.

The larger increase in credit rating conservatism observed in Europe compared to the US may be attributed to the substantial growth in the European bond market during the sample period. As the bond market grew, the competition for market share among CRAs may have driven inflated ratings before the start of our sample period in 1997. Existing literature indicates that strong competition among CRAs tends to compromise the quality and accuracy of ratings (Becker and Milbourn, 2011). It is

therefore plausible to argue that, in their pursuit of new bond issuers, CRAs issued optimistic ratings during the early stages of the European credit rating market. However, the market matured throughout the sample period with CRAs establishing their market positions, and significant events such as the bankruptcies of Enron, WorldCom, and Parmalat, along with the financial crisis and Eurozone crisis, unfolded. These scandals and the maturing of the European bond market could have triggered a shift in focus from market share acquisition to safeguarding reputations. As the reputation effect became more pronounced, it could have prompted increased conservatism in issued ratings. Since the growth of the US credit rating market is less pronounced than the European one during this period (Darmouni and Papoutsi, 2022; Çelik, Demirtaş, and Isaksson, 2019), this could be a potential explanation for the difference observed between the regions.

The shift from market share acquisition to safeguarding reputations could, however, explain the increased conservatism in the US as well. As Fitch started to gain market share in the US in the mid-1990s, this prompted higher rating levels from S&P and Moody's as an attempt to defend their market positions (Becker and Milbourn, 2011). With market shares stabilizing over our sample period, coupled with multiple scandals, the reputation effect could have intensified, leading to increased conservatism. Nevertheless, this explanation remains speculative as we lack granular data on competition and its effect on rating levels and quality covering our entire sample period.

4.2 Ratings Regressions - European Regions

We also run regressions on our European dataset divided into four regions: Northern Europe, Western Europe, Southern Europe, as well as Eastern Europe and Eurasia. For an overview of the countries included in each region, see Appendix I. Table VI presents the results of these regressions, in which the models are constructed similarly to model (1) in Table V, including the explanatory variables and with country and industry fixed effects. The results are similar when estimating the models with fixed firm effects, as detailed in Appendix III. Regressions are estimated over the period 2003 to ensure a sufficient number of firms per year in our sample.

Table VIII

Ratings Models: European Regions

This table presents OLS regressions on European credit ratings by region from 2003 to September 2023. For an overview of what countries are included in each region, see Appendix I. All models (1) through (4) include country dummies and industry dummies based on three-digit SIC codes. Explanatory variables are presented in Table III and Table IV. Standard errors are double clustered at the firm and year level to account for heteroskedasticity and autocorrelation. P-values are shown in brackets.

	(1)	(2)	(3)	(4)
	Northern Europe	Western Europe	Southern Europe	Eastern Europe and Eurasia
Book_Lev	2.603 (<0.001)	2.012 (<0.001)	2.820 (<0.001)	2.524 (<0.001)
Cash/Assets	0.614 (0.551)	-1.938 (<0.001)	-2.602 (0.033)	-1.049 (0.414)
Debt/EBITDA	0.332 (<0.001)	0.165 (<0.001)	0.069 (0.006)	0.120 (0.040)
Neg. Debt/ EBITDA	2.739 (<0.001)	1.508 (<0.001)	0.184 (0.767)	0.407 (0.817)
IntCov	-0.022 (<0.001)	-0.020 (<0.001)	-0.024 (<0.001)	-0.004 (0.433)
Profit	-1.236 (0.195)	-3.859 (<0.001)	-4.789 (<0.001)	-2.717 (0.004)
Size	-1.074 (<0.001)	-1.322 (<0.001)	-1.092 (<0.001)	-1.238 (<0.001)
PPE/Assets	-1.408 (0.033)	0.861 (<0.001)	-2.348 (<0.001)	0.864 (0.226)
CAPEX/Assets	-8.236 (<0.001)	-9.361 (<0.001)	-6.912 (0.004)	-3.500 (0.098)
Volatility	-0.885 (0.693)	4.143 (<0.001)	-6.103 (0.003)	2.836 (0.250)
2004	0.208 (0.538)	0.303 (0.101)	-0.116 (0.810)	-0.272 (0.563)
2005	1.160 (<0.001)	0.739 (<0.001)	0.751 (0.106)	-0.474 (0.307)
2006	1.200 (<0.001)	1.035 (<0.001)	1.277 (0.006)	-0.891 (0.052)
2007	1.421 (<0.001)	1.024 (<0.001)	1.523 (<0.001)	-1.039 (0.022)
2008	1.536 (<0.001)	1.359 (<0.001)	2.130 (<0.001)	-0.903 (0.048)
2009	1.509 (<0.001)	1.674 (<0.001)	2.098 (<0.001)	-0.724 (0.110)
2010	0.841 (0.014)	1.353 (<0.001)	2.444 (<0.001)	-1.317 (0.005)
2011	1.408 (<0.001)	1.492 (<0.001)	2.875 (<0.001)	-1.041 (0.035)
2012	1.836 (<0.001)	1.611 (<0.001)	3.117 (<0.001)	-0.855 (0.085)
2013	1.592 (<0.001)	1.340 (<0.001)	3.050 (<0.001)	-1.052 (0.028)
2014	1.212 (<0.001)	1.318 (<0.001)	2.708 (<0.001)	-1.160 (0.016)
2015	1.401 (<0.001)	1.443 (<0.001)	2.851 (<0.001)	-1.151 (0.016)
2016	1.578 (<0.001)	1.468 (<0.001)	2.729 (<0.001)	-1.377 (0.003)
2017	1.782 (<0.001)	1.443 (<0.001)	2.751 (<0.001)	-1.582 (<0.001)
2018	1.460 (<0.001)	1.474 (<0.001)	2.611 (<0.001)	-1.364 (0.004)
2019	1.745 (<0.001)	1.679 (<0.001)	2.927 (<0.001)	-1.329 (0.006)
2020	1.823 (<0.001)	1.690 (<0.001)	3.384 (<0.001)	-1.443 (0.004)
2021	1.489 (<0.001)	1.395 (<0.001)	2.892 (<0.001)	3.549 (<0.001)
2022	1.986 (<0.001)	1.650 (<0.001)	3.181 (<0.001)	5.408 (<0.001)
2023	1.642 (<0.001)	1.493 (<0.001)	3.130 (<0.001)	0.955 (0.150)
Country Dummies	Y	Y	Y	Y
Industry Dummies	Y	Y	Y	Y
Firm Dummies	N	N	N	N
Observations	763	3930	574	652
Number of firms	67	389	70	71
Adj. $\boldsymbol{R^2}$	0.812	0.743	0.851	0.689

We find that Western and Northern Europe show similar results to the overall European sample, with credit ratings experiencing an average decrease of around one and a half notches since 2003. Southern Europe shows the largest increase in conservatism with a decrease in credit ratings of more than three notches. One possible explanation for this phenomenon is that the southern European countries, such as Greece, Portugal, Spain, and Cyprus, were particularly affected by the Eurozone financial debt crisis and saw severe downgrades of their sovereign ratings. As a result, CRAs in these countries may have become more conservative compared to the rest of Europe as corporate ratings might reflect the credit quality of sovereign debt.

Moreover, up to the Parmalat scandal in Italy in 2004, Southern Europe's development looks similar to that of Western and Northern Europe, diverging afterward with a more pronounced increase. This trend raises questions about whether the standards in Southern Europe were potentially more lenient than in the other regions, justifying a more substantial correction towards more conservative rating models. Alternatively, it raises the possibility of a heightened need to protect reputations following the scandal.

For Eastern Europe and Eurasia, the results are different. The year dummy coefficients show statistically significant negative values from 2013 to 2020. In 2021 however, we observe a notable and statistically significant jump from -1.44 to 3.35 notches, further increasing to 5.41 in 2022. The year dummy coefficient for 2023, while positive, lacks statistical significance. These patterns suggest that Eastern Europe and Eurasia diverge from the consistent trend observed in the rest of Europe or the US, where conservatism has increased over time. Instead, the findings indicate a period of loosening from 2013 to 2020, followed by increased conservatism in 2021 and 2022. This calls for more investigation into the characteristics of the credit rating market, bond market, and regulations present in this region. Notably, most of the firms and observations in the Eastern Europe and Eurasia sample are Russian, and as such, the CRAs in this region do not adhere to EU regulations. A less regulated environment could potentially contribute to the different trend in rating standards compared to other regions. However, it is important to note that the subsample has a limited sample size with 71 firms and 652 firm-years, potentially constraining the broader applicability of the findings. This constraint underscores the necessity for future research with larger datasets to validate the observed trends.

Figure II
Coefficient on Year Dummies, European Regions

Figure II shows the coefficients of the year dummies from the OLS regression models in Table VIII on credit rating data based on European regions between 2003 to September 2023.

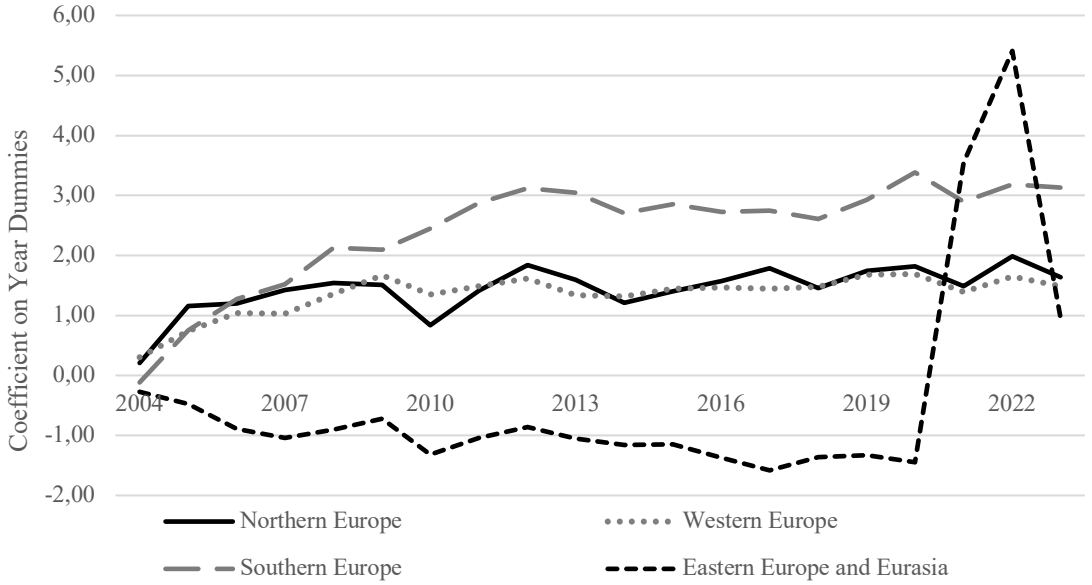


Figure II shows a graph of the year coefficients across the different regions over the sample period. Examining Northern and Western Europe reveals that the effect of increased stringency seems to have subsided somewhere after the financial crisis, with the graphs remaining relatively flat between 2009 and 2023. This is similar to the results observed in the US sample. As mentioned earlier, Southern Europe shows the largest increase in credit rating stringency. This effect seems to persist after the financial crisis leading up to around 2013, when the graph also flattens out. The development of the credit rating stringency in Eastern Europe and Eurasia looks vastly different, suggesting reduced rating standards until 2020, followed by a large increase in conservatism thereafter.

4.3 Default Rates

Theoretically, increased conservatism in credit ratings could be driven by structural changes, such as increased default rates over time among companies. Figure III depicts the 5-year cumulative default rates over time among entities classified as investment grade by S&P, while Figure IV depicts the same for speculative grade. Surprisingly, despite credit ratings becoming more stringent, default rates appear to have declined over the same period for both regions and across both investment and speculative grade firms.

Figure III

5-Year Cumulative Default rates, Investment Grade, Europe & US

Figure III displays the cumulative 5-year default rates for companies classified as investment grade by S&P, categorized by annual cohort and region. Our analysis starts with cohorts originating in 1997 and is concluded at the latest available data point for the five-year default rate, which is in 2017. The source of the data is S&P's report titled "Default, Transition, and Recovery: 2022 Annual European Corporate Default And Rating Transition Study" and "Default, Transition, and Recovery: 2022 Annual U.S. Corporate Default And Rating Transition Study".

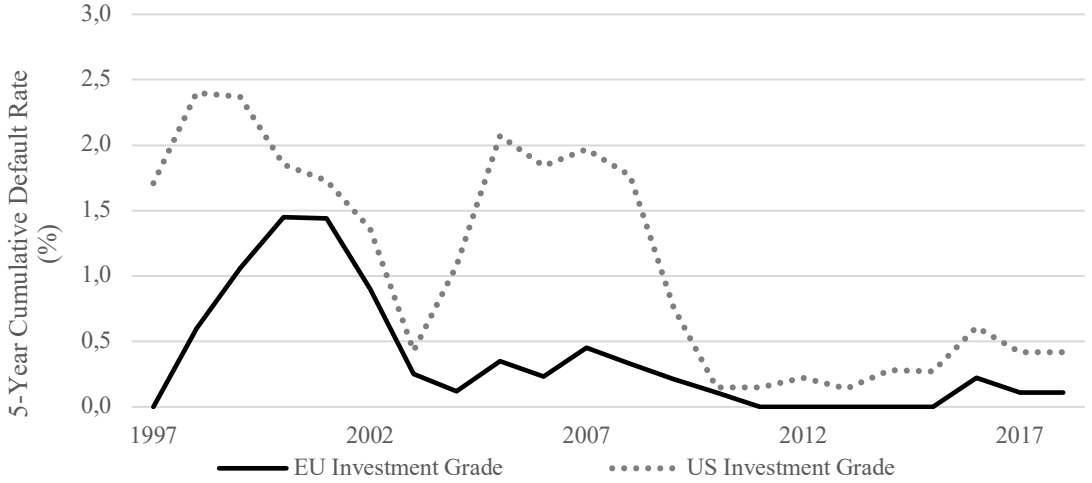


Figure IV

5-Year Cumulative Default Rates, Speculative Grade, Europe & US

Figure IV displays the cumulative five-year default rates for companies classified as speculative grade by S&P, categorized by annual cohort and region. Our analysis starts with cohorts originating in 1997 and is concluded at the latest available data point for the five-year default rate, which is in 2017. The source of the data is S&P's report titled "Default, Transition, and Recovery: 2022 Annual European Corporate Default And Rating Transition Study" and "Default, Transition, and Recovery: 2022 Annual U.S. Corporate Default And Rating Transition Study".

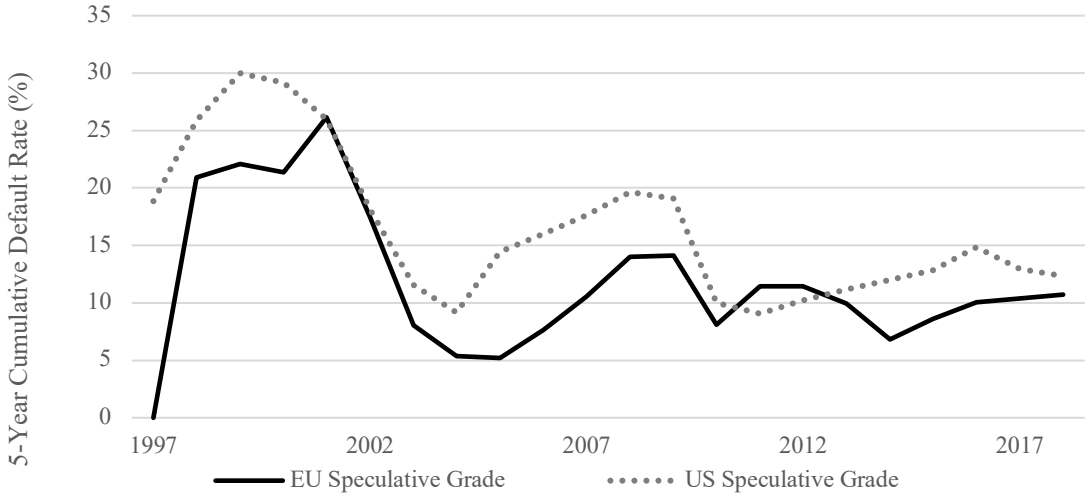


Table VII
Regression on 5-Year Cumulative Default Rates Over Time

The dependent variable represents the cumulative 5-year default rate categorized by annual cohort, S&P rating category, and region. The data source is S&P's reports titled "Default, Transition, and Recovery: 2022 Annual European Corporate Default And Rating Transition Study" and "Default, Transition, and Recovery: 2022 Annual U.S. Corporate Default And Rating Transition Study". The "Linear Trend" variable assumes a value of 0 in 1997, 1 in 1998, 2 in 1999, and so forth. "Recession" quantifies the fraction of NBER recession months experienced by a specific bond cohort during the five-year period. The sample includes bond cohorts spanning from 1997 to 2017. The p-values displayed below in brackets are calculated using Newey-West standard errors with a four-lag estimation to address the overlap in five-year default rates. P-values are shown in brackets.

	(1)	(2)	(3)	(4)
Rating Region:	Europe Investment Grade	Europe Speculative Grade	US Investment Grade	US Speculative Grade
	Cumulative Five-Year Default Rate (in %)			
Linear Trend	-0.043 (0.040)	-0.316 (0.159)	-0.073 (0.069)	-0.658 (0.139)
Recession	0.989 (0.038)	20.989 (0.01)	3.942 (<0.001)	5.573 (0.460)
Constant	0.449 (0.036)	7.484 (0.051)	1.433 (<0.001)	22.584 (<0.001)
Observations	21	21	21	21
Adj. R^2	0.423	0.275	0.832	0.395

This is consistent with the findings in Baghai, Servaes, and Tamayo (2014) who observe a decline in default rates across all rating categories except for the worst ones.

To assess the statistical significance of the default rates, we regress them with a linear trend variable as well as the exposure to recessions. Table VII shows the results. Both regions across both rating classifications exhibit a negative linear trend variable, implying a decline in default rates. For investment grade firms in Europe, this effect is statistically and economically significant. Specifically, European investment grade entities exhibit an annual decrease in 5-year default rates by 0.04 percentage points, Given the inherently low default rates for investment grade entities, these observed changes carry substantial significance.

A counterargument to this finding could be that CRAs are concerned with relative default rates and not absolute. That is, a credit rating estimates how likely a firm is to default relative to other firms. As stated by Baghai, Servaes, and Tamayo (2014), however, this would mean that all firms would have an equal decrease in ratings. As we illustrate in the next section, firms are unequally affected by conservatism.

Table X

Capital Structure Regressions: Leverage Change and Levels, Europe

This table reports the coefficients for regression models of leverage changes and levels in Europe between 2011 to September 2023. L(.) denotes the lag operator. Standard errors are double clustered at the firm and year level to adjust for heteroskedasticity and autocorrelation. P-values are shown in brackets. All explanatory variables are explained in Table V and Table III.

	(1)	(2)	(3)	(4)	(5)	(6)
	Net Debt Issues	*Book_Lev*	*Ltde/Assets*	*Net Debt Issues*	*Book_Lev*	*Ltde_Assets*
L2.*(Rat_Diff$_{ic}$)*	-0.002 (0.161)					
L2.*(Rat_Diff$_{f}$)*				-0.002 (0.260)		
L. *Size*	-0.006 (0.006)			-0.007 (0.560)		
L. *Profit*	0.070 (<0.001)			0.055 (0.047)		
L. *PPE/Assets*	0.009 (0.549)			-0.025 (0.319)		
L. *R&D/Sales*	0.022 (0.763)			0.136 (0.416)		
L. *Rating*	0.001 (0.352)			0.001 (0.440)		
L. *Book_Lev*	-0.137 (<0.001)			-0.154 (<0.001)		
L.*(Rat_Diff$_{ic}$)*		-0.030 (<0.001)	-0.027 (<0.001)			
L.*(Rat_Diff$_{f}$)*					-0.012 (<0.001)	-0.010 (<0.001)
Size		0.026 (<0.001)	0.017 (<0.001)		0.007 (0.027)	0.004 (0.245)
Profit		0.343 (<0.001)	0.337 (<0.001)		0.331 (<0.001)	0.349 (<0.001)
PPE/Assets		0.133 (<0.001)	0.139 (<0.001)		0.003 (0.887)	0.018 (0.424)
R&D/Sales		0.065 (0.454)	0.076 (0.359)		0.182 (0.223)	0.285 (0.043)
Rating		0.036 (<0.001)	0.033 (<0.001)		0.020 (<0.001)	0.018 (<0.001)
Country Dummies	Y	Y	Y	Y	Y	Y
Industry Dummies	Y	Y	Y	Y	Y	Y
Year Dummies	Y	Y	Y	Y	Y	Y
Observations	3728	3728	3728	2536	2536	2536
Number of firms	456	456	456	239	239	239
Adj. $\boldsymbol{R^2}$	0.068	0.592	0.599	0.046	0.626	0.631

4.4 Capital Structure and Cash Holdings

More conservative credit ratings that do not accurately reflect a firm's true default risk could impact firms' capital structure decisions. As firms subject to credit rating conservatism may face higher costs of debt than warranted by their true risk, they may choose to use less debt in their capital structure than what traditional models, which do not account for this conservatism, would suggest. These companies might also decide to keep more cash on hand as a strategic response to conservatism. To examine this implication, we study firms' debt issuance and debt levels as a function of rating conservatism and control variables. Table X contains the regression results for Europe and Table XI for the US.

Table XI

Capital Structure Regressions: Leverage Change and Levels, USA

This table reports the coefficients for regression models of leverage changes and levels in the US between 2011 to September 2023. L(.) denotes the lag operator. Standard errors are double clustered at the firm and year level to adjust for heteroskedasticity and autocorrelation. P-values are shown in brackets. All explanatory variables are explained in Table VI and Table IV.

	(1)	(2)	(3)	(4)	(5)	(6)
	Net Debt Issues	*Book_Lev*	*Ltde/Assets*	*Net Debt Issues*	*Book_Lev*	*Ltde/Assets*
L2.*(Rat_Diff$_i$)*	-0.004 (<0.001)					
L2.*(Rat_Diff$_f$)*				-0.003 (0.014)		
L. *Size*	-0.006 (0.001)			-0.008 (<0.001)		
L. *Profit*	0.058 (<0.001)			0.056 (<0.001)		
L. *PPE/Assets*	0.013 (0.204)			0.011 (0.419)		
L. *R&D/Sales*	-0.061 (0.085)			-0.074 (0.130)		
L. *Rating*	0.001 (0.295)			-0.001 (0.442)		
L. *Book_Lev*	-0.086 (<0.001)			-0.088 (<0.001)		
L.*(Rat_Diff$_i$)*		-0.049 (<0.001)	-0.047 (<0.001)			
L.*(Rat_Diff$_f$)*					-0.008 (<0.001)	-0.008 (<0.001)
Size		0.040 (<0.001)	0.036 (<0.001)		0.010 (<0.001)	0.009 (0.001)
Profit		0.168 (<0.001)	0.171 (<0.001)		0.149 (<0.001)	0.152 (<0.001)
PPE/Assets		0.144 (<0.001)	0.157 (<0.001)		0.064 (0.001)	0.067 (<0.001)
R&D/Sales		-0.339 (<0.001)	-0.331 (<0.001)		-0.211 (0.005)	-0.201 (0.009)
Rating		0.061 (<0.001)	0.061 (<0.001)		0.038 (<0.001)	0.038 (<0.001)
Country Dummies	N	N	N	N	N	N
Industry Dummies	Y	Y	Y	Y	Y	Y
Year Dummies	Y	Y	Y	Y	Y	Y
Observations	9026	9026	9026	5824	5824	5824
Number of firms	1354	1354	1354	701	701	701
Adj. $\boldsymbol{R^2}$	0.050	0.512	0.503	0.042	0.518	0.508

First, we study debt issuance. For the US, we find that the coefficients on our measures of conservatism, Rat_Diff_i and Rat_Diff_f, are negative and statistically significant. This indicates that firms more affected by rating conservatism issue less debt. This is in line with the results of Baghai, Servaes, and Tamayo (2014). The coefficient in column (4) implies that a one notch increase in rating conservatism leads to an average reduction of net debt issues by 0.3% of total assets. This implies a decline in net debt issuance of approximately 9% given that average net debt issues over assets in the sample period is 3.2%.

However, for Europe, the coefficients for Rat_Diff_{ic} and Rat_Diff_f are negative but statistically insignificant. Consequently, we fail to find conclusive evidence

indicating that European firms more affected by rating conservatism issue less debt. The control variables in both regions, however, suggest that firms issue more debt when less leveraged and more profitable.

Next, we study whether rating conservatism affects firms' debt levels, in terms of both total debt to assets *(Book_Lev)*, and long-term debt to assets *(Ltde/Assets)*. In both regions, we consistently observe negative and statistically significant coefficients for Rat_Diff_{ic} and Rat_Diff_{f} in relation to both the *Book_Lev* and *Ltde/Assets* variables. This suggests that firms in both markets tend to carry less debt in response to increased rating conservatism. Based on the regressions in columns (5) with firm fixed effects, a one notch increase in rating conservatism leads to an average decline in book leverage by 1.2 percentage points in Europe and 0.8 percentage points in the US. Further, the control variables suggest that firms have more debt when they are larger, more profitable, have higher tangibility, and have higher credit rating.

The statistically significant negative relationship between rating conservatism and debt levels in Europe, without a corresponding effect on debt issuance, may seem perplexing. One possible explanation could be that these firms might have issued less debt prior to the sample period of 2010-2023, resulting in a naturally lower leverage ratio.

Finally, we examine whether conservatism affects firms' cash holdings. The results for Europe and the US are outlined in Table XII. We find that Rat_Diff_{ic} and Rat_Diff_{f} are statistically insignificant for Europe. For the US, however, the coefficients are statistically significant and negative. This indicates that while we cannot draw a conclusion for Europe, firms more affected by conservatism appear to hold less cash in the US. This contrasts with the results found by Baghai, Servaes, and Tamayo (2014), and is puzzling given that the average cash to assets ratios have increased for US firms in our sample over time (Table IV). A possible explanation could be that the lower ratio of cash to assets might be associated with lower leverage, limiting firms' available capital.

In summary, our results suggest that rating conservatism does affect firms' capital structure decisions. In both regions, firms more affected by rating conservatism have lower leverage levels. For the US, the same also holds for debt issuance. This is in line with the results found by Baghai, Servaes, and Tamayo (2014) and indicates that

Table XII

Cash Holdings Regressions, Europe and USA

This table reports the coefficients for regression models of cash holdings, as measured by cash divided by total assets. L.(.) denotes the lag operator. Standard errors are double clustered at the firm and year level to adjust for heteroskedasticity and autocorrelation. P-values are in brackets. Explanatory variables are defined in Table III, IV, V and VI.

	(1)	(2)	(3)	(4)
	Cash/Assets, Europe	*Cash/Assets, USA*	*Cash/Assets, Europe*	*Cash/Assets, USA*
L.*(Rat_Diff$_{ic}$)*	0.000 (0.644)			
L.*(Rat_Diff$_{i}$)*		-0.005 (<0.001)		
L.*(Rat_Diff$_{f}$)*			-0.002 (0.108)	-0.002 (0.001)
Size	-0.013 (<0.001)	-0.007 (<0.001)	-0.011 (<0.001)	-0.007 (<0.001)
Profit	0.044 (<0.001)	0.025 (0.002)	-0.028 (0.052)	0.011 (0.306)
PPE/Assets	-0.119 (<0.001)	-0.049 (<0.001)	-0.110 (<0.001)	-0.094 (<0.001)
R&D/Sales	-0.285 (<0.001)	0.660 (<0.001)	-0.068 (0.402)	0.629 (<0.001)
NWC/Assets	-0.140 (<0.001)	0.080 (<0.001)	-0.071 (<0.001)	0.118 (<0.001)
Div. Dummy	-0.007 (0.014)	-0.006 (0.017)	-0.006 (0.060)	-0.002 (0.484)
Rating	-0.004 (<0.001)	-0.005 (<0.001)	-0.002 (0.028)	-0.006 (<0.001)
Book_lev	-0.045 (<0.001)	-0.022 (<0.001)	-0.024 (0.040)	-0.030 (<0.001)
CAPEX/Sales	0.034 (0.044)	0.000 (0.966)	-0.044 (0.084)	-0.013 (0.159)
Volatility	0.204 (<0.001)	0.108 (<0.001)	0.096 (0.047)	0.134 (<0.001)
Country Dummies	Y	N	Y	N
Industry Dummies	Y	Y	Y	Y
Year Dummies	Y	Y	Y	Y
Observations	3728	9026	2536	5831
Number of firms	456	1354	239	702
Adj. $\boldsymbol{R^2}$	0.422	0.405	0.465	0.440

firms do not see the conservatism as fully warranted. However, we do not find evidence that firms hold more cash as consequence of rating conservatism over the years 2011-2023. In contrast, firms more affected by rating conservatism appear to hold less cash in the US.

4.5 Effects on Sales Growth

Next, we examine whether rating conservatism has impacted firms' sales growth. If firms receive less favorable financing terms than warranted by their risk profile, resulting in lower leverage, this could potentially impact their ability to invest and grow their operations. Table XII presents the results for Europe and the US. For both regions, we find that firms more affected by rating conservatism generally experience lower sales growth, consistent with the findings of Baghai, Servaes, and Tamayo (2014). Studying the models with firm fixed effects, for each one notch increase in the difference between

Table XIII

Sales Growth, Europe and USA

This table reports the coefficients for regression models of sales growth. L.(.) denotes the lag operator. Standard errors are double clustered at the firm and year level to adjust for heteroskedasticity and autocorrelation. P-values are in brackets. Explanatory variables are defined in Table III, IV, V and VI.

	(1)	(2)	(3)	(4)
	Sales Growth, Europe	*Sales Growth, USA*	*Sales Growth, Europe*	*Sales Growth, USA*
L2.*(Rat_Diff$_{ic}$)*	-0.009 (0.012)			
L2.*(Rat_Diff$_{i}$)*		-0.012 (<0.001)		
L2.*(Rat_Diff$_{f}$)*			-0.006 (0.100)	-0.008 (<0.001)
L. *Size*	-0.005 (0.295	-0.006 (0.136)	-0.002 (0.780)	-0.013 (<0.001)
L. *Profit*	-0.041 (0.335)	-0.098 (<0.001)	-0.029 (0.569)	-0.157 (<0.001)
L. *Rating*	0.003 (0.291)	0.001 (0.789)	-0.002 (0.423)	-0.008 (<0.001)
L. *Book_Lev*	0.021 (0.573)	-0.005 (0.790)	0.022 (0.607)	0.052 (0.011)
Country Dummies	Y	N	Y	N
Industry Dummies	Y	Y	Y	Y
Year Dummies	Y	Y	Y	Y
Observations	3728	9026	2536	5831
Number of firms	456	1354	239	702
Adj. $\boldsymbol{R^2}$	0.200	0.162	0.189	0.160

predicted and actual rating, sales growth decreases by 0.6% in Europe and 0.8% in the US. Considering the average sales growth of 6.4% in Europe (Table V) and 9.5% in the US (Table VI) between 2011-2023, this effect is substantial. This suggests that firms are indeed negatively affected by rating conservatism. By potentially deeming conservatism as unwarranted and consequently holding less leverage, firms might miss out on growth opportunities.

5. Limitations

Our study is subject to some limitations and restrictions. First, we recognize that the robustness of our findings may be influenced by any unobservable variable demonstrating a linear time trend that affects ratings. Our main rating regression models in Table VII and VIII incorporate key variables commonly employed by CRAs when assessing entities, yielding an adjusted R-squared of at least 0.67. Despite this, there remains a risk for omitted variable bias, wherein any omitted variable exhibiting a time trend may explain parts, if not all, of our findings. Additionally, due to limited data availability for European firms in our sample, certain variables employed in prior studies, such as rent payments, convertible debt to assets, beta, and idiosyncratic risks, have been excluded. However, Baghai, Servaes, and Tamayo (2014) find that beta and idiosyncratic risk have

minimal impact on the year dummies in their study. The authors introduce several other variables, such as GDP growth, inflation rate, and price to earnings ratio, to test the robustness of their model. However, these added variables prove to be statistically insignificant, reinforcing the conclusion that the variables we have included are the most significant for our analysis. Nevertheless, we acknowledge that omitting these variables, or any other variable could affect our results.

Furthermore, it's important to acknowledge the limited size of our European sample. Merging S&P ratings with Compustat financials results in a substantial loss of observations and firms. This occurs because many rated firms either lack financial data reported in Compustat or lack a common company identifier necessary for merging the two datasets. The financial data is also less detailed than in our US dataset, resulting in the omittance of some explanatory variables as described above. Despite several European countries maintaining central databases for public firms' financials, the absence of a comprehensive central database covering all European public firms remains a challenge. To improve the inclusivity of our dataset, a more comprehensive central database with financial information on European public firms is needed.

6. Conclusion

We find that conservatism in credit ratings has increased in both Europe and the US from 1997 to 2023. The average firm in Europe declines by more than three notches, and around two notches in the US. The effect is most prominent prior to the financial crisis, whereafter it levels off. Within Europe, the effect is most pronounced in Southern Europe, while Eastern Europe and Eurasia deviate from this pattern of conservatism. Next, we examine if this effect can be explained by increased default rates. We do not find evidence of increased default rates in either Europe or the US, implying that observed conservatism may not be warranted.

Next, we find that conservatism is an explanatory factor in firms' capital structure decisions, as firms more affected by conservatism maintain lower leverage. This pattern holds true for both Europe and the US. However, we do not find evidence that these firms compensate for their limited leverage by accumulating larger cash reserves. Finally, we find that firms more affected by rating conservatism experience lower sales

growth in both regions, suggesting that firms are negatively affected by rating conservatism.

Our paper confirms that the conservatism documented in the US by previous researchers (Alp, 2013; Baghai, Servaes, and Tamayo, 2014; Blume, Lim, and MacKinlay, 1998; Jones, Gwilym, and Mantovan, 2022), also applies to Europe. Interestingly, the effect is even larger in Europe, with regional variations. This has large economic implications when considering the pivotal role credit ratings play in financial markets and debt pricing. A European company that received a BBB+ rating in 1997, indicating status well above investment-grade, would, holding firm characteristics constant, be classified as high yield or "junk" in 2023.

The question of why conservatism occurs, why it appears to have leveled off after the financial crisis, and why there are regional differences, remains undetermined and thus serves as a foundation for future research. We hypothesize that the numerous scandals and regulatory interventions involving CRAs throughout our sample period may have contributed to the increased conservatism observed in both regions. We also speculate that the effect could be attributed to the credit rating market maturing over our sample period, causing agencies to shift from market share acquisition to defending their reputations. In the infancy stages of the credit rating markets, preceding our sample period, the competition for market share among major CRAs could have induced issuer-friendly and inflated ratings, an effect evidenced by literature (Becker and Milbourn, 2011; Bae, Driss, and Roberts, 2019; Bar-Isaac and Shapiro, 2013; Baghai and Becker, 2020). As the market has matured over time and market shares have stabilized, the reputation effect could have mitigated the inflated rating levels (Becker and Milbourn, 2011; Covitz and Harrison, 2003; Mathis, McAndrews, and Rochet, 2009), ultimately causing an increase in rating conservatism throughout the sample period.

We posit that this shift from market share acquisition to safeguarding reputations could also explain the larger increase in credit rating conservatism in Europe compared to the US, given the more pronounced growth in the European market throughout the sample period. However, substantiating this explanation requires more evidence on the evolution of competition among CRAs over time and its impact on rating levels and quality.

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7. Appendix

7.1 Appendix I: Countries Included in European Regions

Appendix I

Countries Included in European Regions

This table presents the countries as divided by region included in our sample. The sectioning is primarily motivated by geography, but also considers economic and political factors.

Northern Europe	*Western Europe*	*Southern Europe*	*Eastern Europe and Eurasia*
Denmark	Austria	Cyprus	Bulgaria
Finland	Belgium	Greece	Czech Republic
Lithuania	France	Gibraltar	Hungary
Norway	Germany	Italy	Poland
Sweden	Ireland	Portugal	Russia
	Luxembourg	Spain	Slovenia
	Netherlands		Turkey
	Switzerland		
	United Kingdom		

7.2 Appendix II: Summary Statistics – European Regions

Appendix II.I

Summary Statistics: Northern Europe Regressions

This table provides annual averages for the variables used in the European regions ratings regressions, on our Northern European subsample. The Northern Europe subset includes countries Denmark, Finland, Lithuania, Norway, and Sweden. The dependent variable, *Rating*, is a numeric representation of credit ratings, where AAA is coded as 1, AA+ as 2, AA as 3, and so on. *Book_Lev* is computed as the ratio of total debt to total assets, *Cash/Assets* denotes cash and cash equivalents relative to total assets, *Debt/EBITDA* signifies the ratio of total debt to EBITDA, *Neg. Debt/EBITDA* is a binary variable set to one if *EBITDA* is negative and zero otherwise, *IntCov* is calculated as EBITDA divided by interest expenses, *Profit* is derived from EBITDA divided by sales, *Size* represents the natural logarithm of the book value of total assets in constant 2017 dollars, *PPE/Assets* indicates net property, plant, and equipment divided by total assets, and *Capex/Assets* denotes capital expenditures divided by total assets. *Vol* measures the volatility of profitability, using data from the current year and the four preceding years; at least two years of data are required for its calculation. In cases where the ratio of total debt to EBITDA is negative, it is set to zero. For companies with zero interest payments, *IntCov* is set to the 99th percentile of its distribution. All explanatory variables, except for *Size* and *Neg. Debt/EBITDA* are subject to winsorization at the 99th percentile. Profitability, interest coverage, and the volatility of profitability are also winsorized at the 1st percentile.

Year	*Rating*	*Book_Lev*	*Cash/ Assets*	*Debt/ EBITDA*	*Neg. Debt/ EBITDA*	*IntCov*	*Profit*	*Size*	*PPE/ Assets*	*Capex/ Assets*	*Vol*
2003	8.483	0.300	0.075	2.686	0.034	11.801	0.153	8.823	0.355	0.046	0.032
2004	8.533	0.292	0.090	2.449	0.067	13.475	0.170	8.890	0.359	0.043	0.031
2005	8.781	0.252	0.088	2.090	0.000	20.193	0.197	8.947	0.368	0.054	0.036
2006	8.900	0.246	0.085	2.255	0.033	17.217	0.192	9.063	0.349	0.056	0.035
2007	8.967	0.247	0.090	2.109	0.000	17.997	0.201	9.054	0.336	0.058	0.033
2008	9.290	0.290	0.080	2.268	0.000	15.737	0.207	9.257	0.321	0.051	0.029
2009	9.576	0.293	0.081	3.106	0.000	12.448	0.183	9.398	0.314	0.051	0.027
2010	9.606	0.294	0.096	3.669	0.061	9.784	0.166	9.210	0.321	0.042	0.035
2011	9.531	0.281	0.108	2.439	0.031	15.718	0.190	9.263	0.314	0.040	0.033
2012	9.971	0.281	0.091	2.908	0.000	14.061	0.191	9.282	0.307	0.040	0.031
2013	9.971	0.292	0.113	2.917	0.000	14.798	0.178	9.172	0.292	0.041	0.027
2014	9.647	0.292	0.100	3.498	0.000	15.462	0.179	9.308	0.297	0.041	0.025
2015	9.703	0.295	0.089	2.942	0.000	16.153	0.191	9.220	0.297	0.041	0.019
2016	9.500	0.278	0.092	2.288	0.000	17.734	0.202	9.090	0.286	0.047	0.018
2017	9.878	0.289	0.092	2.601	0.000	16.485	0.196	9.044	0.269	0.046	0.020
2018	9.105	0.258	0.091	2.373	0.026	19.591	0.203	9.247	0.281	0.049	0.021
2019	9.286	0.257	0.080	1.972	0.024	23.966	0.209	9.120	0.271	0.049	0.029
2020	9.545	0.283	0.080	2.576	0.000	24.247	0.226	9.091	0.303	0.044	0.031
2021	9.435	0.287	0.108	2.579	0.043	21.903	0.219	9.106	0.316	0.042	0.033
2022	9.511	0.274	0.101	2.448	0.021	30.531	0.233	9.231	0.273	0.036	0.038
2023	9.220	0.269	0.091	2.125	0.040	30.517	0.245	9.120	0.262	0.038	0.034
Mean	9.388	0.279	0.092	2.584	0.018	18.876	0.200	9.139	0.304	0.045	0.029

Appendix II.II

Summary Statistics: Western Europe Regressions

This table provides annual averages for the variables used in the European regions ratings regressions, on our Western European subsample. The Western Europe subset includes countries Austria, Belgium, France, Germany, Ireland, Luxembourg, Netherlands, Switzerland, and the United Kingdom. The dependent variable, *Rating*, is a numeric representation of credit ratings, where AAA is coded as 1, AA+ as 2, AA as 3, and so on. *Book_Lev* is computed as the ratio of total debt to total assets, *Cash/Assets* denotes cash and cash equivalents relative to total assets, *Debt/EBITDA* signifies the ratio of total debt to EBITDA, *Neg. Debt/EBITDA* is a binary variable set to one if *EBITDA* is negative and zero otherwise, *IntCov* is calculated as EBITDA divided by interest expenses, *Profit* is derived from EBITDA divided by sales, *Size* represents the natural logarithm of the book value of total assets in constant 2017 dollars, *PPE/Assets* indicates net property, plant, and equipment divided by total assets, and *Capex/Assets* denotes capital expenditures divided by total assets. *Vol* measures the volatility of profitability, using data from the current year and the four preceding years; at least two years of data are required for its calculation. In cases where the ratio of total debt to EBITDA is negative, it is set to zero. For companies with zero interest payments, *IntCov* is set to the 99th percentile of its distribution. All explanatory variables, except for *Size* and *Neg. Debt/EBITDA* are subject to winsorization at the 99th percentile. Profitability, interest coverage, and the volatility of profitability are also winsorized at the 1st percentile.

Year	*Rating*	*Book_Lev*	*Cash/ Assets*	*Debt/ EBITDA*	*Neg. Debt/ EBITDA*	*IntCov*	*Profit*	*Size*	*PPE/ Assets*	*Capex/ Assets*	*Vol*
2003	8.701	0.302	0.082	3.219	0.022	7.876	0.158	9.399	0.300	0.049	0.034
2004	8.879	0.309	0.094	2.866	0.006	9.368	0.175	9.335	0.306	0.046	0.030
2005	9.061	0.296	0.100	2.766	0.012	10.670	0.181	9.433	0.303	0.048	0.031
2006	9.060	0.274	0.097	2.391	0.012	11.247	0.186	9.516	0.284	0.049	0.029
2007	8.962	0.267	0.092	2.447	0.013	11.380	0.181	9.566	0.261	0.050	0.026
2008	8.969	0.258	0.089	2.280	0.006	11.452	0.192	9.740	0.259	0.054	0.025
2009	9.263	0.276	0.079	2.474	0.013	11.799	0.186	9.842	0.260	0.052	0.024
2010	9.333	0.282	0.102	3.261	0.006	10.848	0.179	9.769	0.264	0.041	0.025
2011	9.432	0.271	0.103	2.808	0.000	13.241	0.196	9.657	0.266	0.043	0.027
2012	9.480	0.278	0.098	2.598	0.011	13.836	0.198	9.709	0.262	0.046	0.026
2013	9.256	0.273	0.104	2.666	0.011	14.027	0.193	9.647	0.261	0.047	0.026
2014	9.422	0.274	0.106	2.727	0.005	13.985	0.198	9.517	0.275	0.050	0.024
2015	9.715	0.290	0.099	3.054	0.010	13.337	0.197	9.484	0.266	0.047	0.023
2016	9.833	0.292	0.099	3.016	0.015	13.776	0.201	9.412	0.258	0.044	0.026
2017	9.796	0.291	0.099	3.043	0.019	15.302	0.200	9.424	0.253	0.043	0.027
2018	9.826	0.285	0.098	2.851	0.014	15.307	0.201	9.431	0.254	0.042	0.025
2019	9.860	0.291	0.096	3.143	0.000	15.107	0.201	9.506	0.247	0.042	0.023
2020	10.054	0.330	0.097	3.334	0.018	13.641	0.208	9.506	0.279	0.038	0.027
2021	9.920	0.340	0.130	3.928	0.071	13.210	0.190	9.585	0.265	0.033	0.035
2022	9.705	0.306	0.130	3.472	0.031	19.763	0.209	9.653	0.252	0.033	0.040
2023	9.559	0.300	0.116	3.099	0.017	19.755	0.211	9.518	0.248	0.037	0.038
Mean	9.497	0.292	0.102	2.976	0.016	13.630	0.194	9.549	0.266	0.044	0.028

Appendix II.III

Summary Statistics: Southern Europe Regressions

This table provides annual averages for the variables used in the European regions ratings regressions, on our Southern European subsample. The Southern Europe subset includes countries Cyprus, Greece, Gibraltar, Italy, Portugal, and Spain. The dependent variable, *Rating*, is a numeric representation of credit ratings, where AAA is coded as 1, AA+ as 2, AA as 3, and so on. *Book_Lev* is computed as the ratio of total debt to total assets, *Cash/Assets* denotes cash and cash equivalents relative to total assets, *Debt/EBITDA* signifies the ratio of total debt to EBITDA, *Neg. Debt/EBITDA* is a binary variable set to one if *EBITDA* is negative and zero otherwise, *IntCov* is calculated as EBITDA divided by interest expenses, *Profit* is derived from EBITDA divided by sales, *Size* represents the natural logarithm of the book value of total assets in constant 2017 dollars, *PPE/Assets* indicates net property, plant, and equipment divided by total assets, and *Capex/Assets* denotes capital expenditures divided by total assets. *Vol* measures the volatility of profitability, using data from the current year and the four preceding years; at least two years of data are required for its calculation. In cases where the ratio of total debt to EBITDA is negative, it is set to zero. For companies with zero interest payments, *IntCov* is set to the 99th percentile of its distribution. All explanatory variables, except for *Size* and *Neg. Debt/EBITDA* are subject to winsorization at the 99th percentile. Profitability, interest coverage, and the volatility of profitability are also winsorized at the 1st percentile.

Year	*Rating*	*Book_Lev*	*Cash/ Assets*	*Debt/ EBITDA*	*Neg. Debt/ EBITDA*	*IntCov*	*Profit*	*Size*	*PPE/ Assets*	*Capex/ Assets*	*Vol*
2003	8.000	0.394	0.106	3.739	0.000	7.501	0.321	9.688	0.442	0.057	0.024
2004	8.077	0.410	0.089	5.581	0.000	6.476	0.311	9.682	0.415	0.052	0.027
2005	8.938	0.383	0.101	3.391	0.000	6.767	0.306	9.649	0.350	0.043	0.023
2006	9.333	0.376	0.084	3.038	0.000	9.603	0.343	9.498	0.361	0.052	0.027
2007	9.211	0.381	0.088	2.924	0.000	11.408	0.329	9.638	0.331	0.054	0.027
2008	9.611	0.385	0.076	3.103	0.000	9.053	0.338	9.770	0.353	0.064	0.025
2009	9.706	0.428	0.063	3.554	0.000	6.576	0.332	9.918	0.370	0.063	0.028
2010	10.667	0.411	0.081	3.701	0.000	6.610	0.316	9.516	0.389	0.049	0.027
2011	11.476	0.372	0.101	3.697	0.000	5.622	0.275	9.570	0.310	0.048	0.027
2012	12.160	0.367	0.087	3.604	0.040	6.248	0.254	9.301	0.281	0.050	0.041
2013	12.357	0.343	0.082	3.862	0.000	5.863	0.247	9.012	0.281	0.047	0.036
2014	12.161	0.363	0.105	3.989	0.000	5.610	0.221	9.016	0.283	0.041	0.027
2015	12.313	0.339	0.112	4.191	0.000	6.592	0.194	9.026	0.273	0.040	0.026
2016	12.235	0.338	0.101	4.262	0.000	10.425	0.207	8.723	0.294	0.046	0.031
2017	12.086	0.368	0.111	3.890	0.000	8.593	0.236	8.771	0.269	0.041	0.032
2018	11.889	0.379	0.122	4.008	0.000	9.784	0.241	8.771	0.250	0.044	0.027
2019	12.108	0.413	0.114	5.039	0.000	12.743	0.244	8.891	0.245	0.049	0.029
2020	12.429	0.410	0.113	4.574	0.000	9.918	0.244	8.906	0.268	0.045	0.029
2021	12.268	0.401	0.137	6.761	0.073	6.341	0.209	8.928	0.234	0.029	0.054
2022	11.632	0.353	0.135	4.386	0.105	8.934	0.226	9.194	0.208	0.028	0.058
2023	11.615	0.343	0.125	4.265	0.026	10.211	0.247	9.056	0.209	0.038	0.055
Mean	11.418	0.376	0.107	4.247	0.016	8.379	0.254	9.146	0.285	0.044	0.034

Appendix II.IV

Summary Statistics: Eastern Europe and Eurasia Regressions

This table provides annual averages for the variables used in the European regions ratings regressions, on our Eastern Europe and Eurasia subsample. The Eastern Europe and Eurasia subset includes countries Bulgaria, Czech Republic, Hungary, Poland, Russia, Slovenia, and Turkey. The dependent variable, *Rating*, is a numeric representation of credit ratings, where AAA is coded as 1, AA+ as 2, AA as 3, and so on. *Book_Lev* is computed as the ratio of total debt to total assets, *Cash/Assets* denotes cash and cash equivalents relative to total assets, *Debt/EBITDA* signifies the ratio of total debt to EBITDA, *Neg. Debt/EBITDA* is a binary variable set to one if *EBITDA* is negative and zero otherwise, *IntCov* is calculated as EBITDA divided by interest expenses, *Profit* is derived from EBITDA divided by sales, *Size* represents the natural logarithm of the book value of total assets in constant 2017 dollars, *PPE/Assets* indicates net property, plant, and equipment divided by total assets, and *Capex/Assets* denotes capital expenditures divided by total assets. *Vol* measures the volatility of profitability, using data from the current year and the four preceding years; at least two years of data are required for its calculation. In cases where the ratio of total debt to EBITDA is negative, it is set to zero. For companies with zero interest payments, *IntCov* is set to the 99th percentile of its distribution. All explanatory variables, except for *Size* and *Neg. Debt/EBITDA* are subject to winsorization at the 99th percentile. Profitability, interest coverage, and the volatility of profitability are also winsorized at the 1st percentile.

Year	*Rating*	*Book_Lev*	*Cash/ Assets*	*Debt/ EBITDA*	*Neg. Debt/ EBITDA*	*IntCov*	*Profit*	*Size*	*PPE/ Assets*	*Capex/ Assets*	*Vol*
2003	13.714	0.172	0.072	1.086	0.000	12.874	0.333	8.385	0.653	0.100	0.060
2004	13.680	0.228	0.068	1.681	0.000	12.349	0.308	8.247	0.628	0.103	0.065
2005	13.172	0.240	0.068	1.626	0.034	17.878	0.307	8.449	0.598	0.103	0.053
2006	12.387	0.195	0.065	1.190	0.000	21.186	0.314	8.527	0.592	0.103	0.045
2007	12.353	0.193	0.064	1.240	0.000	22.164	0.308	8.597	0.556	0.093	0.042
2008	12.171	0.200	0.070	1.563	0.000	19.855	0.316	8.802	0.543	0.105	0.040
2009	12.343	0.229	0.095	1.595	0.000	16.029	0.310	8.867	0.542	0.109	0.042
2010	11.645	0.231	0.117	2.134	0.000	13.819	0.303	9.017	0.535	0.077	0.044
2011	11.577	0.257	0.117	2.258	0.000	18.653	0.298	9.302	0.495	0.082	0.043
2012	11.464	0.258	0.090	1.683	0.000	18.168	0.308	9.362	0.487	0.087	0.050
2013	11.647	0.294	0.082	2.426	0.000	13.871	0.268	9.109	0.505	0.089	0.041
2014	11.892	0.303	0.079	2.309	0.000	9.712	0.250	9.077	0.504	0.086	0.045
2015	11.975	0.373	0.112	2.488	0.000	9.986	0.265	8.979	0.475	0.082	0.037
2016	12.000	0.365	0.109	2.491	0.000	10.719	0.279	8.758	0.479	0.083	0.037
2017	11.568	0.350	0.099	2.617	0.000	7.765	0.283	8.906	0.486	0.080	0.032
2018	11.500	0.322	0.091	2.263	0.000	9.050	0.276	9.057	0.497	0.078	0.032
2019	11.364	0.350	0.094	2.124	0.000	13.532	0.313	9.249	0.502	0.080	0.028
2020	10.759	0.323	0.101	2.010	0.000	13.205	0.321	9.526	0.531	0.081	0.029
2021	16.000	0.337	0.129	2.734	0.000	11.001	0.308	9.405	0.522	0.069	0.031
2022	17.414	0.319	0.123	2.245	0.000	23.071	0.320	9.530	0.477	0.069	0.037
2023	12.636	0.345	0.153	2.945	0.000	15.204	0.251	8.565	0.287	0.044	0.025
Mean	12.456	0.283	0.094	2.041	0.002	14.517	0.296	8.957	0.521	0.087	0.041

7.3 Appendix III: Rating Results – European Regions (Firm Fixed Effects)

Appendix III

Ratings Regression on European Regions with Firm Dummies Models

This table presents OLS regressions on European credit ratings by region from January 2003 to September 2023. For an overview of what countries are included in each region, see Appendix I. All models (1) through (4) include firm dummies. Explanatory variables are presented in Table III and Table IV. Standard errors are clustered at the firm and year level to account for heteroskedasticity and autocorrelation. P-values are shown in brackets.

	(1)	(2)	(3)	(4)
	Northern Europe	Western Europe	Southern Europe	Eastern Europe and Eurasia
Book_Lev	2.082 (<0.001)	3.251 (<0.001)	2.314 (<0.001)	1.460 (0.072)
Cash/Assets	-0.975 (0.334)	-1.557 (<0.001)	-1.821 (0.134)	-0.650 (0.638)
Debt/EBITDA	0.260 (<0.001)	0.089 (<0.001)	0.076 (0.003)	0.076 (0.190)
Neg. Debt/ EBITDA	2.258 (<0.001)	0.728 (0.003)	0.560 (0.360)	0.160 (0.922)
IntCov	-0.012 (<0.001)	-0.010 (<0.001)	-0.019 (<0.001)	-0.002 (0.691)
Profit	-3.114 (0.005)	-3.057 (<0.001)	-1.724 (0.155)	-1.513 (0.228)
Size	-0.839 (<0.001)	-0.726 (<0.001)	-0.129 (0.509)	-0.804 (<0.001)
PPE/Assets	1.821 (0.022)	-0.350 (0.269)	0.474 (0.562)	1.183 (0.252)
CAPEX/Assets	-8.198 (<0.001)	-4.967 (<0.001)	-6.841 (0.004)	-2.326 (0.296)
Volatility	0.058 (0.977)	2.203 (0.004)	-5.160 (0.011)	3.052 (0.327)
2004	0.228 (0.431)	0.151 (0.207)	-0.204 (0.628)	-0.148 (0.739)
2005	1.016 (<0.001)	0.472 (<0.001)	0.528 (0.195)	-0.422 (0.348)
2006	1.102 (<0.001)	0.703 (<0.001)	1.117 (0.006)	-0.981 (0.029)
2007	1.361 (<0.001)	0.641 (<0.001)	1.227 (0.002)	-1.210 (0.008)
2008	1.522 (<0.001)	0.929 (<0.001)	1.581 (<0.001)	-1.165 (0.014)
2009	1.597 (<0.001)	1.224 (<0.001)	1.772 (<0.001)	-0.977 (0.038)
2010	1.034 (<0.001)	1.045 (<0.001)	2.200 (<0.001)	-1.475 (0.002)
2011	1.536 (<0.001)	1.076 (<0.001)	2.827 (<0.001)	-1.238 (0.015)
2012	1.890 (<0.001)	1.163 (<0.001)	3.223 (<0.001)	-1.087 (0.034)
2013	1.685 (<0.001)	0.913 (<0.001)	3.399 (<0.001)	-1.233 (0.013)
2014	1.345 (<0.001)	0.945 (<0.001)	2.989 (<0.001)	-1.447 (0.004)
2015	1.442 (<0.001)	0.973 (<0.001)	3.027 (<0.001)	-1.319 (0.009)
2016	1.612 (<0.001)	1.022 (<0.001)	3.047 (<0.001)	-1.471 (0.003)
2017	1.569 (<0.001)	0.991 (<0.001)	3.006 (<0.001)	-1.616 (0.001)
2018	1.415 (<0.001)	1.054 (<0.001)	2.929 (<0.001)	-1.469 (0.003)
2019	1.581 (<0.001)	1.172 (<0.001)	3.245 (<0.001)	-1.372 (0.007)
2020	1.581 (<0.001)	1.251 (<0.001)	3.639 (<0.001)	-1.554 (0.003)
2021	1.368 (<0.001)	1.081 (<0.001)	3.310 (<0.001)	3.463 (<0.001)
2022	1.789 (<0.001)	1.239 (<0.001)	3.474 (<0.001)	5.367 (<0.001)
2023	1.568 (<0.001)	1.135 (<0.001)	3.530 (<0.001)	1.298 (0.052)
Country Dummies	N	N	N	N
Industry Dummies	N	N	N	N
Firm Dummies	Y	Y	Y	Y
Observations	763	3930	574	652
Number of firms	67	389	70	71
Adj. R^2	0.862	0.896	0.887	0.744