



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

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## Background and Motivation

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- Rating agencies have been accused of increased leniency over time in rating mortgage backed securities
- Financial institutions relied on ratings that were too lax; massive defaults ensued
- This paper:
  - Bread-and-butter of rating agencies: corporate ratings
  - Have rating agencies become more lenient over time and what are the consequences?



## Summary of Findings

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- Rating agencies have become more *conservative*
  - Holding firm characteristics constant, ratings have dropped by about 3 notches between 1985 and 2009
- Interpretations
  - Determinants of default rates have changed
  - Conservatism is unwarranted
- Default rates have declined over time, pointing to 2<sup>nd</sup> interpretation



## If conservatism is unwarranted ...

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- Firms may take it into account in debt issuance decisions
  - They do: the higher conservatism, the less debt issued and the lower leverage
  - Firms for which conservatism would have been particularly severe opt out of the public bond market
  - Real effects: Firms with higher conservatism:
    - Grow less
    - Spend less on acquisitions
    - Hold more cash
    - Only weak evidence that they invest less



## If conservatism is unwarranted ...

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- Market may take increased conservatism into account when pricing debt:
  - It does: the more a firm has been hit by conservatism, the lower the credit spread, holding its current rating constant
  - Market does not fully undo the effect



# Data

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- S&P Bond ratings from Compustat Ratings File: 1985-2009
  - Financials, utilities, government and quasi-government removed
- Accounting data from Compustat
- Yields from the Merrill Lynch Corporate Master Index and Merrill Lynch Corporate High Yield Index: 1997-6/2009
- 21 categories: AAA, AA+, AA, AA-, A+, A, A-, BBB+, BBB, BBB-, BB+, BB, BB-, B+, B, B-, CCC+, CCC, CCC-, CC, C: assigned numbers from 1 to 21
  - BBB- and above: investment grade
  - Below BBB-: non investment grade / speculative / junk
- Three month lag between rating and accounting data

# Table I

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



# The Ratings Model

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- Dependent variable: Rating from 1 to 21
- Explanatory variables: variables employed in previous papers & in practice:
  - Debt to assets
  - Convertible debt to assets
  - Rents to assets
  - Cash and marketable securities to assets
  - Debt to EBITDA : 0 if negative and dummy
  - Coverage: EBITDA / interest
  - Profits: EBITDA / sales
  - Volatility of profits
  - Size (log book value of assets in 2005 dollars)
  - Tangibility: PPE/Assets, Capex/Assets
  - Beta
  - Idiosyncratic risk: MSE from market model regression





# The Ratings Model

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- Three-digit industry dummies or firm fixed effects
- Key variables: year dummies
- Various models:
  - OLS and ordered logit models with industry dummies and beta & idiosyncratic risk
  - OLS and ordered logit models with industry dummies but without beta & idiosyncratic risk
  - OLS with firm fixed effects with and without beta & idiosyncratic risk

# Coefficients on year dummies (Table III, Panel A)

	(1) OLS	(2) Ord. Logit	(3) OLS	(4) Ord. Logit	(5) OLS	(6) OLS
1986	0.334	0.232	0.345	0.357	0.163	0.228
1987	0.565	0.416	0.539	0.536	0.368	0.437
1988	0.614	0.485	0.427	0.462	0.521	0.474
1989	0.728	0.557	0.495	0.509	0.597	0.497
1990	0.760	0.591	0.482	0.476	0.703	0.619
1991	0.705	0.509	0.385	0.322	0.712	0.638
1992	0.736	0.540	0.492	0.456	0.694	0.656
1993	0.841	0.648	0.693	0.643	0.685	0.730
1994	1.047	0.818	0.927	0.855	0.802	0.876
1995	1.101	0.875	1.027	0.959	0.900	0.983
1996	1.242	0.986	1.150	1.097	0.989	1.084
1997	1.378	1.069	1.347	1.255	1.024	1.159
1998	1.379	1.045	1.435	1.308	1.062	1.209
1999	1.570	1.204	1.605	1.446	1.220	1.347
2000	1.938	1.517	1.976	1.801	1.547	1.687
2001	2.092	1.621	2.058	1.849	1.788	1.875
2002	2.303	1.783	2.194	1.980	2.005	2.060
2003	2.574	2.037	2.436	2.230	2.197	2.233
2004	2.912	2.342	2.712	2.479	2.429	2.449
2005	3.097	2.520	2.878	2.645	2.624	2.609
2006	3.341	2.749	3.117	2.892	2.822	2.798
2007	3.409	2.811	3.155	2.944	2.889	2.841
2008	3.486	2.860	3.288	3.091	3.039	3.002
2009	3.354	2.791	3.124	2.967	2.927	2.869

# Figure 1: Year dummies over time





## Findings

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- Rating agencies have become more conservative over time
- Effect is dramatic: 3 notches by 2006, even in models with firm fixed effects
- AAA firm in 1985 would be AA or AA- by 2009
- BBB firm in 1985 would have lost its investment grade rating by 2009

# Predicted probabilities based on ordered probit for the average firm (Table III, Panel B)

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



# Robustness

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- Results hold using only variables proposed by Blume et al. (1998)
- Entry of new firms versus downgrades?
  - Results hold when we only include firms on Compustat since 1985
  - Newly rated firms have worse rating, but results unaffected
- Additional controls
  - Discretionary accruals
  - Pension liabilities
  - Squares & cubes of all explanatory variables
  - Debt spreads
  - Market leverage and market value assets
  - Macro variables

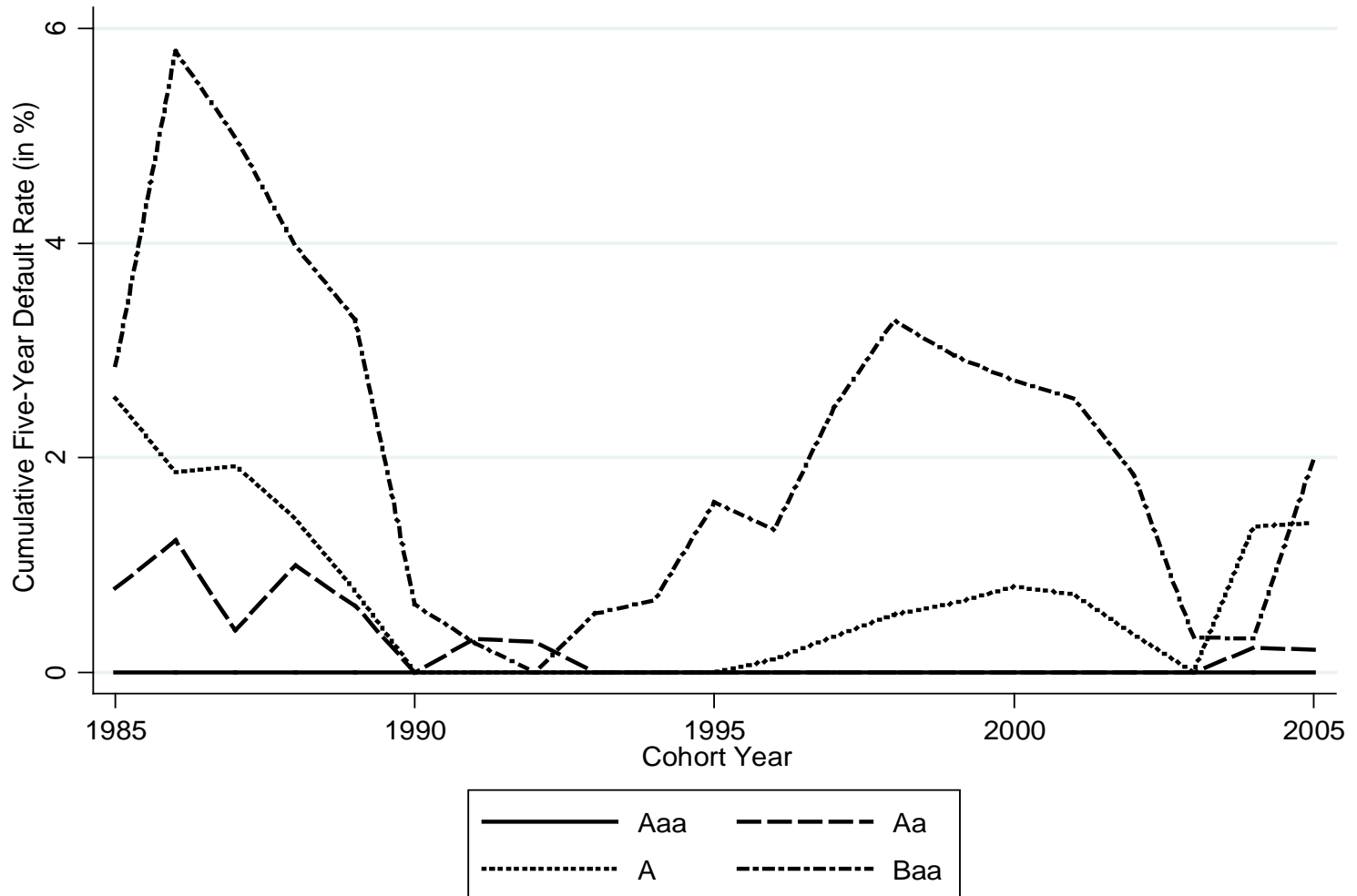


## What does this mean?

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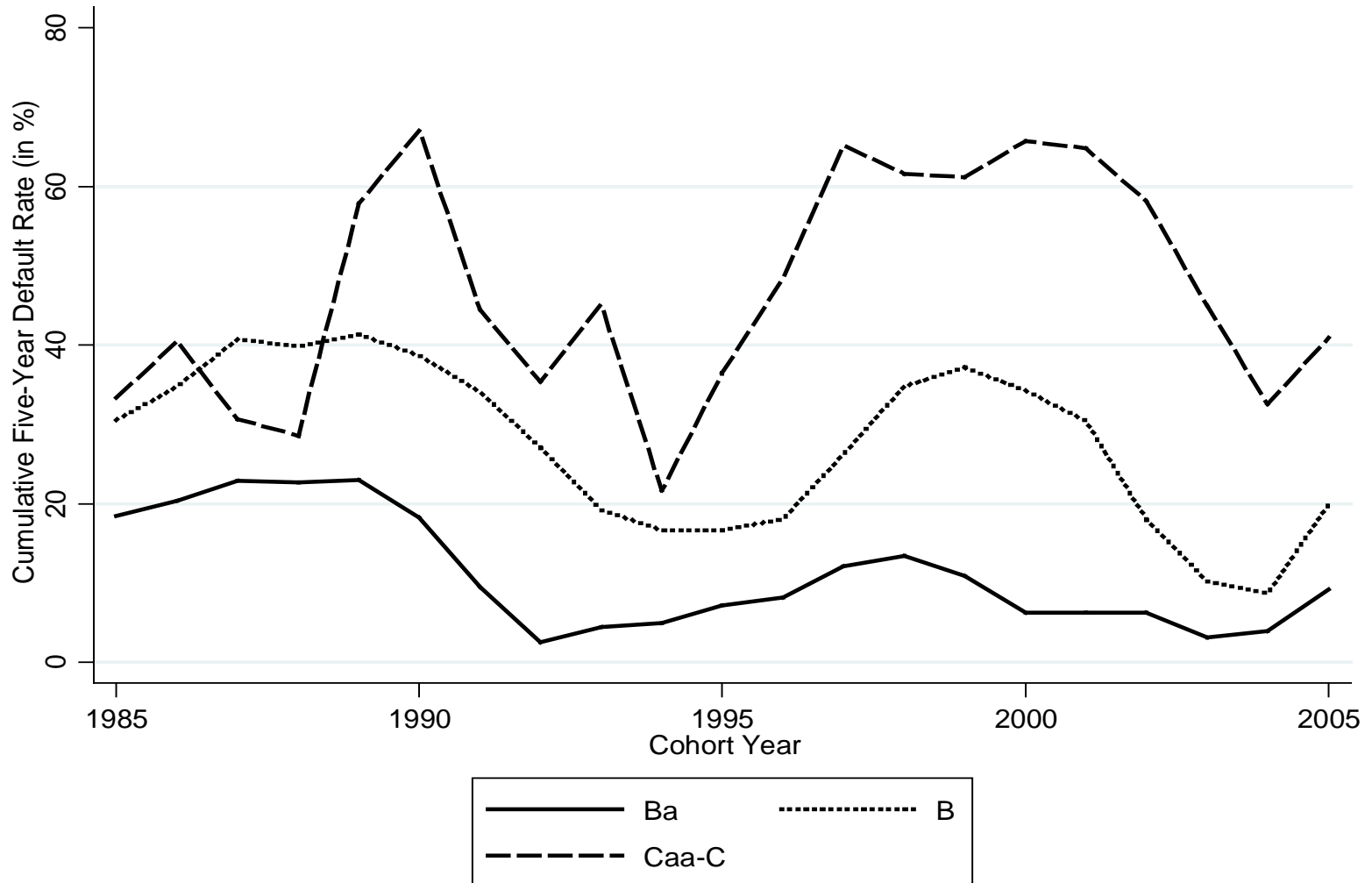
- Determinants of defaults have changed over time
  - If so: No time trend in defaults
- Ratings have become more/too conservative
  - If so: Default rates should decline over time
- Problem: defaults are affected by economic cycle

# Five-year defaults over time from Moody's (investment grade)





# Five-year defaults over time from Moody's (non-investment grade)



# Time series regression of default rates, controlling for recession months (Table IV)

Rating:	(1) Aa	(2) A	(3) Baa	(4) Ba	(5) B	(6) Caa-C
Cumulative Five-Year Default Rate (in %)						
Linear Trend	-0.046 (<.01)	-0.060 (0.14)	-0.141 (0.05)	-0.989 (<.01)	-1.259 (<.01)	0.657 (0.23)
Recession	1.508 (<.01)	5.103 (<.01)	9.319 (0.03)	45.751 (0.02)	60.708 (0.03)	21.053 (0.69)
Constant	0.567 (<.01)	0.852 (0.15)	2.692 (<.01)	16.913 (<.01)	34.628 (<.01)	38.425 (<.01)
Observations	21	21	21	21	21	21
Adjusted R-squared	0.508	0.314	0.300	0.750	0.536	0.022

Default rates have declined over time  
Other tests: No trend in recovery rates



## Impact on capital structure

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- Debt ratings affect the cost of debt
- If the increased ratings conservatism is deemed unwarranted, firms may take it into account when issuing debt, which will affect leverage
- Two sets of models estimated over 1997-2009:
  - Debt issuance =  $f(\text{conservatism and control variables})$
  - Leverage =  $f(\text{conservatism and control variables})$
- Conservatism: actual rating – predicted rating based on ratings model estimated over 1985-1996



## Dependent variables

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- Net debt issued = (debt issues – retirements) / assets
- Long-term debt / assets
- Total interest bearing debt / assets
- Market leverage = total interest bearing debt / (market equity + total interest bearing debt)
  
- Ratings model used for prediction estimated over period 1985-1996 without year dummies, but:
  - with industry dummies: Rat\_Diff\_Ind
  - with firm fixed effects: Rat\_Diff\_Firm
- Capital structure regressions estimated over period 1997-2009



## Issues

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- We control for the firm's actual rating in the regression model:
  - Allows us to answer the question: holding the firm's actual rating constant, what is the impact of increased conservatism on capital structure
  - Also addresses omitted variable bias in ratings model
- Conservatism measure is lagged to attenuate endogeneity

## Debt issues (Table VI)

	(1)	(2)
L2.(Rat_Diff_Ind)	-0.002 (<.01)	
L2.(Rat_Diff_Firm)		-0.003 (<.01)
Control variables	Y	Y
Industry dummies	Y	Y
Year dummies	Y	Y
Observations	9,769	6,001
Number of firms	1,754	887
Adjusted R-squared	0.070	0.072

Increasing conservatism by one notch reduces debt issuance by 8%

## Debt levels (Table VI)

	(1)	(2)	(3)	(4)	(5)	(6)
	Ltde / Assets	Book_Lev	Mkt_Lev	Ltde / Assets	Book_Lev	Mkt_Lev
L.(Rat_Diff_Ind)	-0.052 (<.01)	-0.059 (<.01)	-0.040 (<.01)			
L.(Rat_Diff_Firm)				-0.012 (<.01)	-0.011 (<.01)	-0.005 (0.03)
Control variables	Y	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y	Y
Year dummies	Y	Y	Y	Y	Y	Y
Observations	11,832	11,831	11,831	6,730	6,729	6,729
Number of firms	1,999	1,999	1,999	935	935	935
Adjusted R-squared	0.588	0.627	0.696	0.544	0.529	0.672



## Debt market access

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- Does increased conservatism lead firms to opt out of the bond market altogether?
- Borrow the model of Faulkender and Petersen (2006) predicting bond market access based on a dummy as to whether a firm is rated or not
- Estimate a logit model of bond market access for all Compustat firms as function of:
  - Faulkender and Petersen's variables
  - Predicted rating based on new model minus predicted rating based on old model: `Rat_Diff_Predictions`:
    - the higher this number, the more the firm would have suffered from conservatism if rated



## Table VIII

S&P500	1.372 (<.01)
NYSE	0.267 (<.01)
Ln(MVA)	1.065 (<.01)
Ln(Age +1)	0.307 (<.01)
Ln(%Rated +1)	1.211 (<.01)
Young Firm	0.010 (0.93)
Profit	0.526 (<.01)
PPE / Assets	-0.025 (0.91)
Market-to-Book	-0.434 (<.01)
Advertising / Sales	-1.741 (0.34)
Asset_Vol	0.431 (<.01)
R&D / Sales	-0.777 (<.01)
Ann. Ret.	0.054 (0.06)
Rat_Diff_Predictions_Ind	-1.141 (<.01)
Industry dummies	Y
Observations	43,168
Number of firms	7,877
Pseudo R-squared	0.554

Increasing predicted conservatism by one notch reduces the likelihood of obtaining a bond rating by 9 percentage points



## Bottom Line on Capital Structure

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- Conservatism affects debt issuance and capital structure
- Firms that are most affected issue less debt and have lower leverage
- Firms that would have suffered most from conservatism opt out of the bond market altogether
  
- Does not fully address whether the increased conservatism is fair, but firms act as if it is unfair

## Impact on cash holdings: Table IX

	(1)	(2)
	Cash / Assets	
L.(Rat_Diff_Ind)	0.006 (<.01)	
L.(Rat_Diff_Firm)		0.002 (0.04)
Control variables	Y	Y
Industry dummies	Y	Y
Year dummies	Y	Y
Observations	10,468	5,877
Number of firms	1,881	871
Adjusted R-squared	0.462	0.479

Conservatism  
leads to  
increased cash  
holdings

## Impact on growth and investment: Table X

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Sales Growth		CAPEX / Sales		Acq. / Sales		R&D / Sales	
L2.(Rat_Diff_Ind)	-0.004		-0.001		-0.002		-0.0001	
	(0.08)		(0.16)		(0.11)		(0.28)	
L2.(Rat_Diff_Firm)		-0.008		-0.001		-0.002		-0.0001
		(<.01)		(0.19)		(0.02)		(0.20)
Control variables	Y	Y	Y	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y	Y	Y	Y
Year dummies	Y	Y	Y	Y	Y	Y	Y	Y
Observations	10,559	6,461	10,514	6,435	9,460	5,745	10,558	6,460
Number of firms	1,794	904	1,790	903	1,717	868	1,794	904
Adjusted R-squared	0.155	0.140	0.767	0.773	0.089	0.098	0.913	0.920

Significant impact on sales growth

Effect on other measures of investment is modest, at best



## Effect on debt spreads

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- Does the market take this increased conservatism into account when pricing the debt?
- Test – we estimate the following regression at the bond level:  
Spread over 5-year treasuries =  
f(conservatism, control variables)



## Data

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- Yields from the Merrill Lynch Corporate Master Index and Merrill Lynch Corporate High Yield Index: 1997-June 2009
- 6,632 Bonds
- 1,260 Companies
- ~ 250,000 Monthly observations
- We have monthly data on spreads & rating of each bond issue
- We have annual data on conservatism



## Explanatory variables

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- Conservatism: Actual – Predicted rating
  - using ratings model estimated with firm fixed effects (reduces number of firms and observations – results are very similar when using ratings model estimated with industry fixed effects)
- Actual bond rating
- Maturity: Log of #days to maturity
- Equity volatility
- Expected default frequency (EDF)
- Annualized stock return over previous 12 months
- Profitability, tangibility, book leverage
- Dummies for each bond or each firm & time dummies

## Results – Table XII

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rat_Diff_Firm	-0.095 (<.01)	-0.201 (<.01)	-0.115 (<.01)	-0.198 (<.01)	-0.148 (<.01)	-0.074 (<.01)	-0.187 (<.01)	-0.116 (<.01)
Issue Rating	0.741 (<.01)	0.848 (<.01)	0.750 (<.01)	0.846 (<.01)	0.559 (<.01)	0.507 (<.01)	0.593 (<.01)	0.544 (<.01)
Maturity control	N	N	Y	Y	Y	Y	Y	Y
Equity vol, EDF, return controls	N	N	N	N	Y	Y	Y	Y
Profit, leverage, tang. controls	N	N	N	N	N	N	Y	Y
Firm dummies	Y	N	Y	N	Y	N	Y	N
Bond dummies	N	Y	N	Y	N	Y	N	Y
Year-Month dummies	Y	Y	Y	Y	Y	Y	Y	Y
Observations	197,662	197,662	197,662	197,662	195,995	195,995	193,625	193,625
Number of firms	701	701	701	701	698	698	694	694
Number of bonds	4,864	4,864	4,864	4,864	4,836	4,836	4,795	4,795
Adjusted R-squared	0.637	0.728	0.663	0.730	0.775	0.816	0.776	0.816



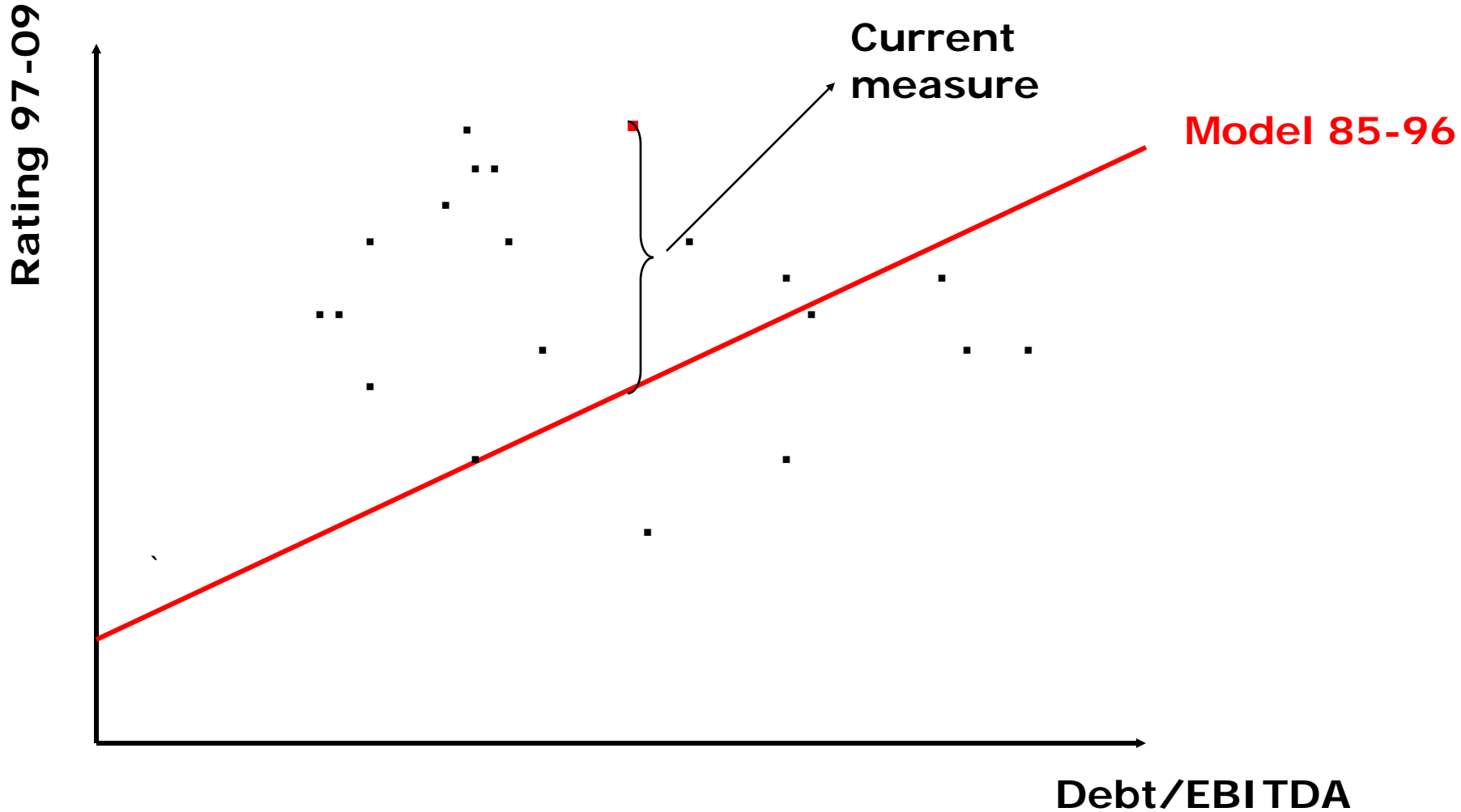


## Results

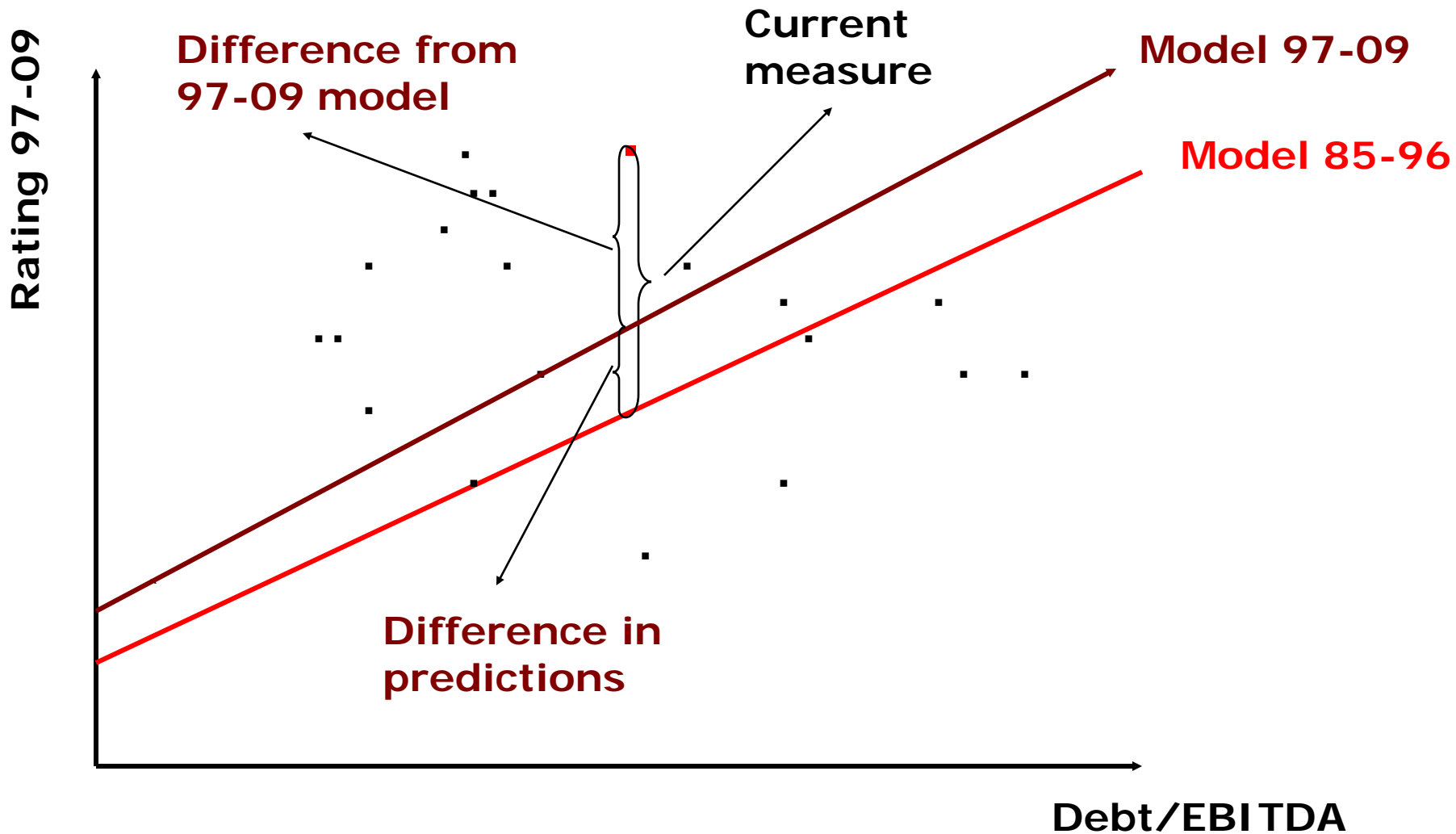
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- Depending on the specification, the market undoes between 12% and 32% of the effect of rating conservatism
- This does not directly speak to whether the ratings conservatism is justified, but the market acts as if not fully justified

# Robustness: An alternative measure of conservatism



# Robustness: An alternative measure of conservatism





## Robustness

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- We split up the difference between the actual rating and rating predicted by the old model (our measure of conservatism) into:
  - Difference in predictions between the two models (as we did for debt market access)
  - Difference from the new model
- If our findings are about changes in the model, they should be due to differences in predictions
- We repeat all regression models using both elements of the difference
  - Ratings model estimated with firm fixed effects
  - Difference in predictions: `Rat_Diff_Predictions_Firm`
  - Difference from new model: `Rat_Diff_New_Firm`

## Table XIII – Panel A: Debt issuance regressions

	Net Debt Issues
L2.(Rat_Diff_Predictions_Firm)	-0.002 (0.02)
L2.(Rat_Diff_New_Firm)	-0.005 (<.01)
Control variables	Y
Industry and Year dummies	Y
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Observations	5,994
Number of firms	881
Adjusted R-squared	0.073

## Table XIII – Panel B: Leverage regressions

Dependent Variable	(1) Ltde / Assets	(2) Book_ Lev	(3) Mkt_ Lev
L.(Rat_Diff_Predictions_Firm)	-0.011 (0.00)	-0.009 (0.01)	-0.002 (0.53)
L.(Rat_Diff_New_Firm)	-0.014 (0.00)	-0.017 (0.00)	-0.012 (0.00)
Control variables	Y	Y	Y
Industry and Year dummies	Y	Y	Y
Observations	6725	6724	6724
Number of firms	930	930	930
Adjusted R-squared	0.544	0.530	0.673

# Table XIII – Panel C: Debt spread regressions

	(1)	(2)
	Yield Spread	
Rat_Diff_Predictions_Firm	-0.278 (<.01)	-0.268 (<.01)
Rat_Diff_New_Firm	-0.183 (<.01)	-0.111 (<.01)
Issue Rating	0.593 (<.01)	0.545 (<.01)
Control variables	Y	Y
Firm dummies	Y	N
Bond dummies	N	Y
Year-Month dummies	Y	Y
Observations	193,492	193,492
Number of firms	679	679
Number of bonds	4,772	4,772
Adjusted R-squared	0.777	0.817



## Robustness test

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- The difference between the predictions is significant in virtually all specifications
- The residual from the current model also matters





## Conclusions

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- We document increased conservatism by rating agencies over the period 1985-2009
- Does not appear to be just changes in default probabilities because
  - Default rates decline over time
  - Firms take it into account when determining capital structure, cash holdings
  - The market takes it into account when determining debt spreads
- Not consistent with conflict of interest story
- Examining why this change has happened is left to future research