An Examination of Rating Corporate Bonds Through the Cycle

Ash Evans

Research Questions

- Today
  - Do Standard & Poor's rate corporate bonds through the cycle?

- Also in paper
  - Baseline credit rating migration intensities for directional multiplicative intensity models
  - Demography-controlled model

S&P Rating Criteria

"there is no point in assigning high ratings to a company enjoying peak prosperity if that performance level is expected to be only temporary. Similarly, there is no need to lower ratings to reflect poor performance as long as one can reliably anticipate that better times are just around the corner." (Standard & Poor's, 2006, pg. 34)

This policy should result in

"… the observed rates of default in any period for Standard & Poor's ratings will vary over time and for different sectors depending on where a particular industry is within the economic cycle." (Standard & Poor's Risk Solutions, 2006, pg. 4)

Implications and Regulation

- Correlated Risks
- Basel II
  - Risk weightings for minimum capital requirements
  - Eligible collateral
- Solvency II ???

Literature Review – Time Dependence

- ## Default Models
  - Giampieri et al. (2005): two state hidden Markov, where issuers switch between normal and enhanced risk states
  - Koopman et al. (2005): default cycle forecasting using a trigonometric time-series model

- ## Credit Rating Migration Models
  - Nickell et al. (2000) and Bangia et al. (2002): look at multi-state migration model, with regime dependent on state of business cycle. Matrices different

Literature Review – Systemic Risks

- Default Models
  - Koopman and Lucas (2005): regresses GDP to show correlation
- Credit Rating Migration Models
  - Amato and Furfine (2004): no cyclicality, but control for financial and business risks
  - Altman and Rajken (2004): ratings more consistent with long-term default rates
  - Trück (2005): speculative grade issuers more susceptible to business cycle
  - Stefanescu et al. (2006): macroeconomic cycles and shocks appear in the best-fitting model
  - Feng et al. (2008): shows cyclicality via latent-factor probit model

Directional Multiplicative Intensity Model – Objectives

- Overcome data constraints in estimating migration probabilities
  - Model the direction of the migration and the distance of the migration separately

- Isolate influences at different levels:
  - Issuer-specific effects (e.g. momentum, productivity)
  - Stratum-specific effects (e.g. industry heterogeneity)
  - Baseline effects (e.g. macroeconomic influences)

- Continuous-Time

Directional Multiplicative Intensity Model – Design

- Migration intensity between two ratings =
  directional migration intensity
  × conditional destination probability

- Directional migration intensity =
  baseline directional migration intensity
  × relative risk function

- Baseline intensities apply to all issuers within a stratum

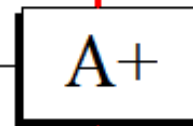- Relative risk scales the baseline intensity for each issuer
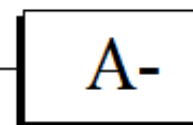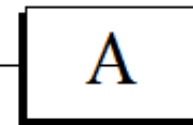
DMIM: A Hypothetical Issuer

Controlling for Issuer-specific Effects

- ## Market-Reaction Model
  - The equity market reacts to similar information
  - Use *relative* equity measures to capture persistent changes in an issuer's financial and business risks
  - Avoid controlling for systemic risks
 - Covariates: relative return, volatility and size

Housekeeping

- ## Data Sources
  - Mergent's Fixed Income Security Database
  - Centre for Research in Security Prices US Stock Database

- ## Credit Ratings
  - Investment grade: AA+, AA, … , BBB-
  - Speculative grade: BB+, BB, … , CCC
  - Excluded: AAA, CCC-

- ## Time Interval
  - 1 January 1997 to 31 December 2006
  - Truncate 2 years for smoothed estimates

- ## Today: Downgrades Only

A Runs Test – Credit Rating A

Industrials: p-value=0.001
Financials: p-value=0.001
Utilities: p-value<0.001
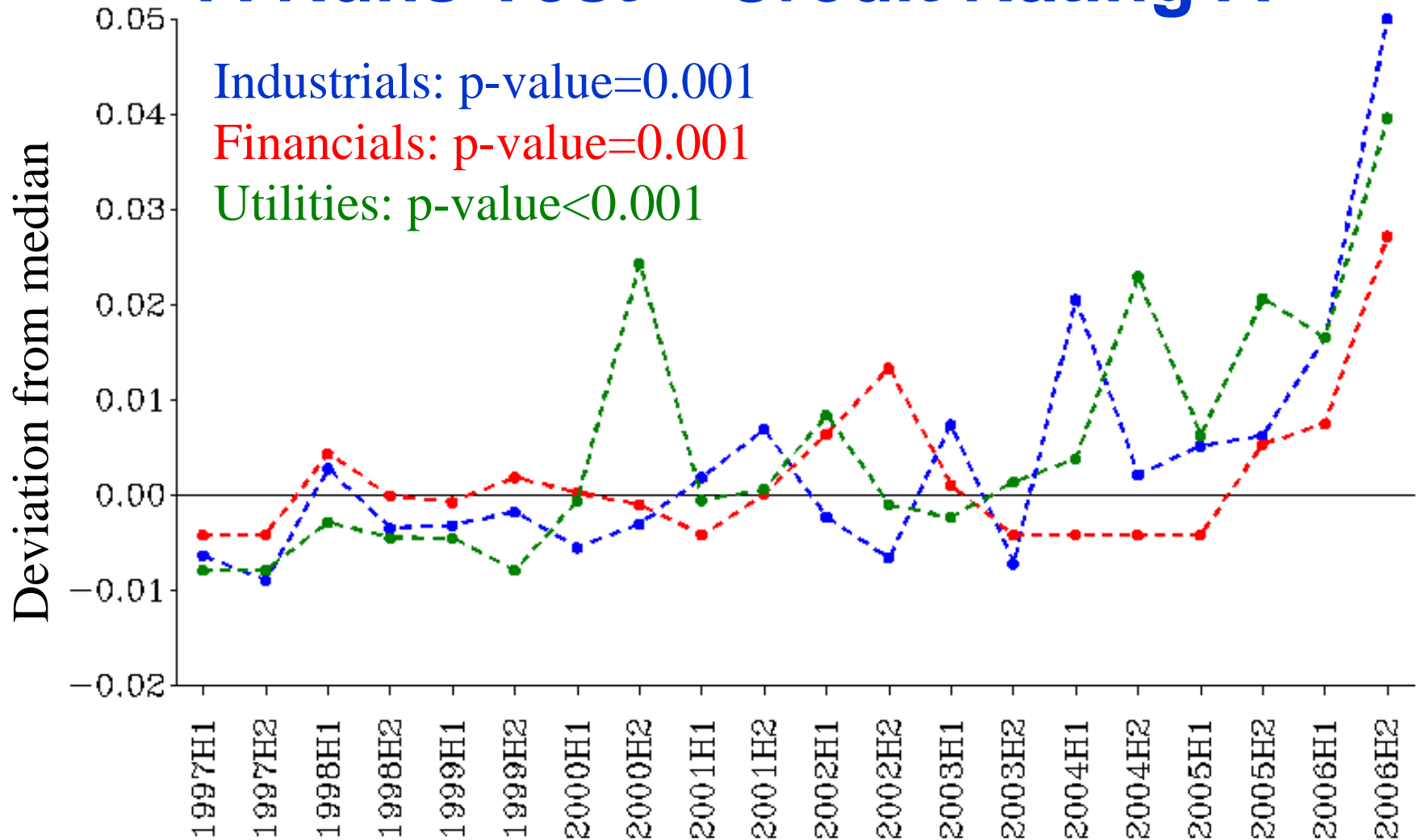
Runs Tests – Results

Credit Rating	Industrials				Financials				Utilities			
	median	+ve's	+ve groups	p-value	median	+ve's	+ve groups	p-value	median	+ve's	+ve groups	p-value
AA+	0.000	4	3	0.239	0.000	3	3	1.000	0.000	3	3	1.000
AA	0.005	10	6	0.081	0.000	7	6	0.643	0.000	3	3	1.000
AA-	0.039	10	6	0.081	0.000	9	5	0.033	0.021	10	4	0.001
A+	0.016	10	5	0.013	0.007	10	7	0.285	0.002	10	6	0.081
A	0.011	10	4	0.001	0.004	10	4	0.001	0.008	10	3	0.000
A-	0.012	10	5	0.013	0.006	10	4	0.001	0.008	10	5	0.013
BBB+	0.011	10	4	0.001	0.007	10	8	0.625	0.010	10	4	0.001
BBB	0.014	10	5	0.013	0.007	10	2	0.000	0.005	10	3	0.000
BBB-	0.001	10	3	0.000	0.000	10	5	0.013	0.000	8	5	0.084
BB+	0.001	10	3	0.000	0.001	10	5	0.013	0.000	4	4	1.000
BB	0.009	10	4	0.001	0.002	10	6	0.081	0.000	4	3	0.239
BB-	0.013	10	3	0.000	0.006	10	3	0.000	0.000	4	4	1.000
B+	0.005	10	2	0.000	0.004	10	5	0.013	0.000	6	3	0.011
B	0.001	10	3	0.000	0.001	10	4	0.001	0.000	5	3	0.051
B-	0.000	10	4	0.001	0.000	8	3	0.001	0.000	0	0	0.000
CCC+	0.001	10	3	0.000	0.000	8	6	0.340	0.000	4	3	0.239
CCC	0.000	10	5	0.013	0.000	2	1	0.043	0.000	2	2	1.000

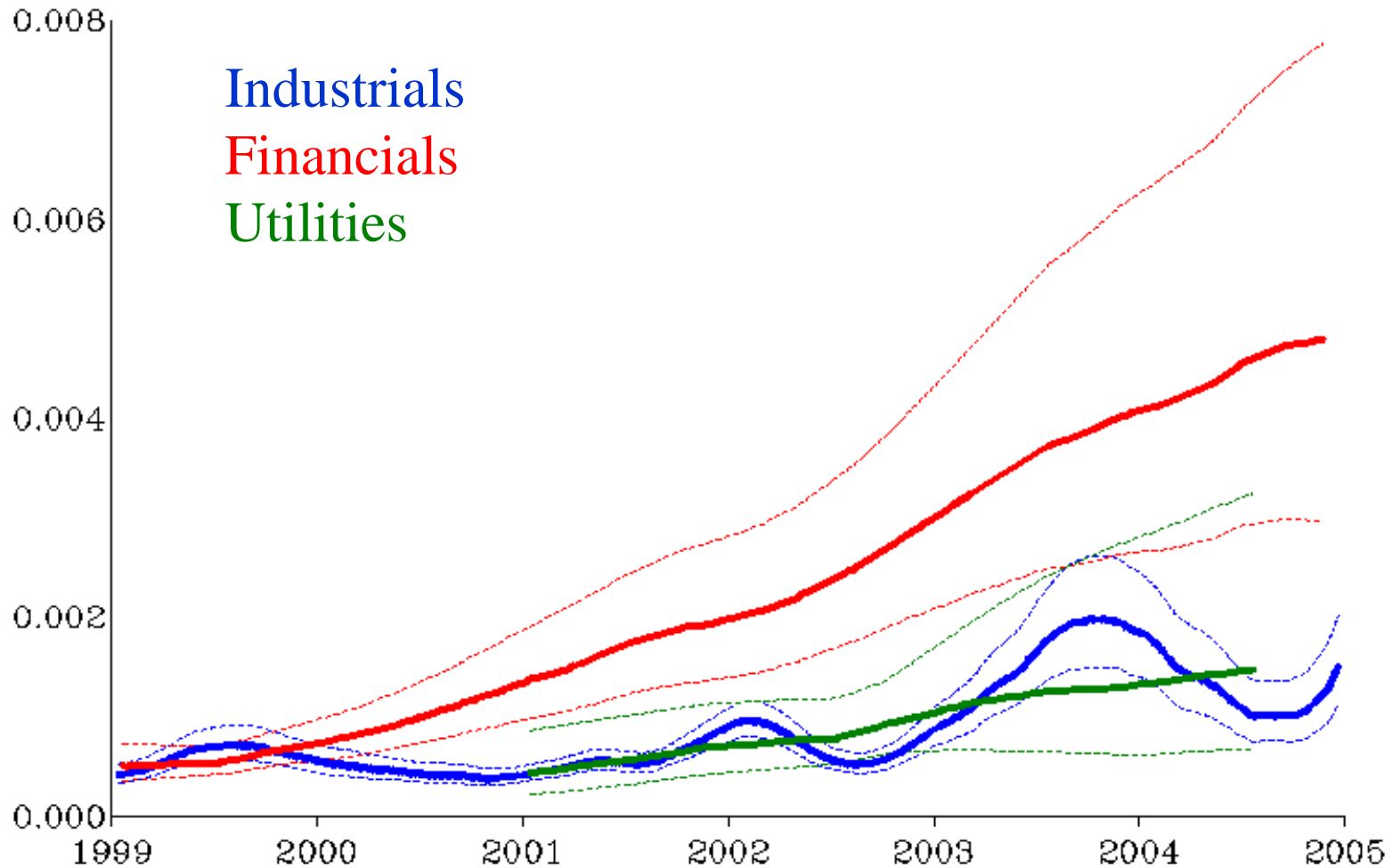| Legend			
<1%	<5%	<10%	invalild test

Smoothed Baseline Downgrade Intensities from Investment Grade
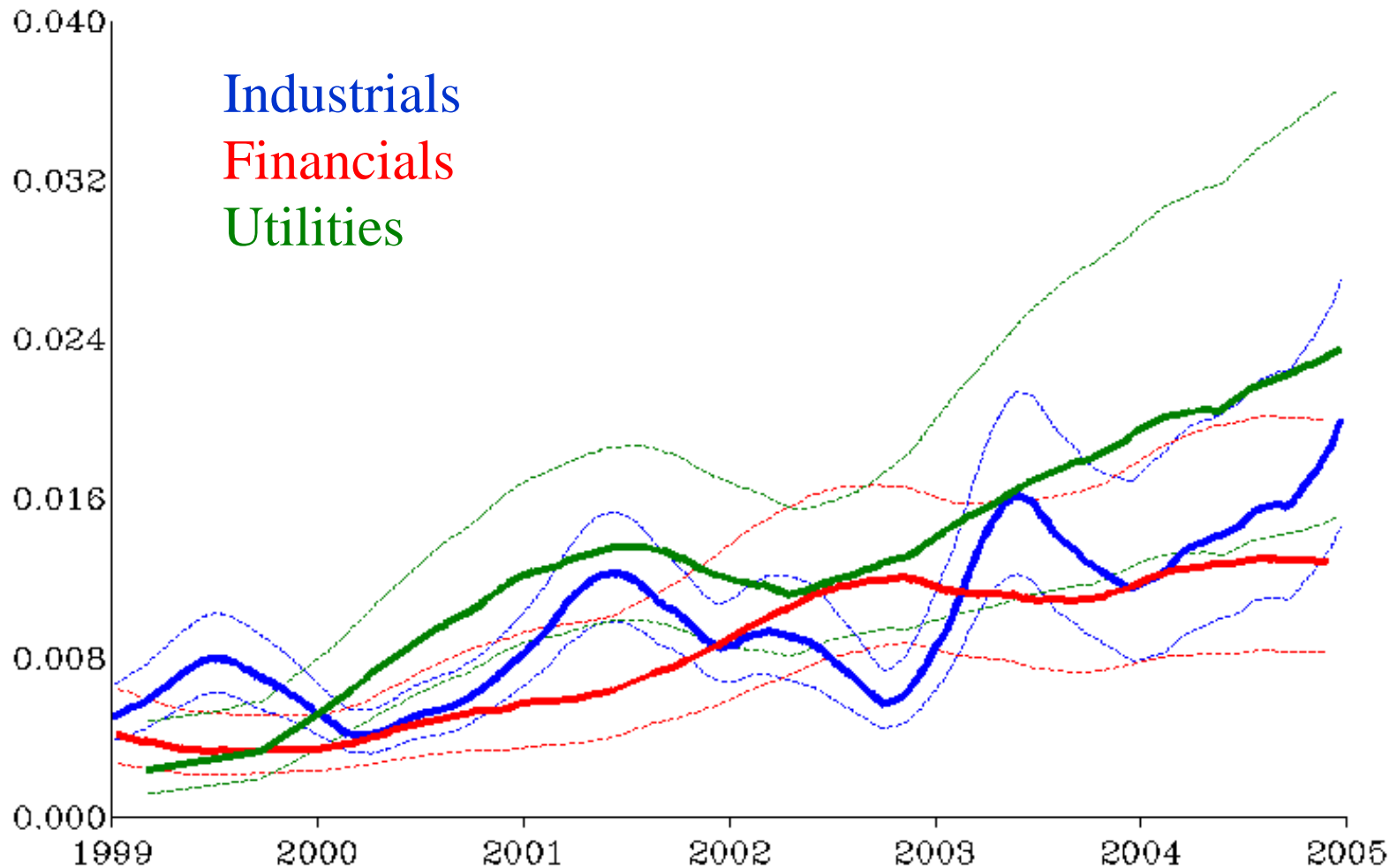
Smoothed Baseline Downgrade Intensities from Speculative Grade

Consequences

- Correlated Risk
  - Systemic risk in falling below minimum credit quality restrictions; i.e. investment grade bond only

- We cannot diversify away all risk for corporate bonds where default risk is negligible

Further Research

- ## Causation
  - Macroeconomic covariates
  - Trigonometric functions

- ## Survival Models
  - Complete probabilistic model for assessing where portfolio of will be over time

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