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A Relative Approach to Measuring Firm Riskiness

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Outline

- Paper: Using a Multiplicative Intensity Process to Forecast Firm Failure
- Purpose: Rank firms by future riskiness using publicly available information
- Questions:
 - What firm data can be used forecast failure?
 - Does this change with the forecast length?
 - What effect does industry sector have?



Specifications, Advancements

- Previous survival analyses: usually discrete time periods and absolute probabilities
 - Particularly Shumway (2001)
- Failure definition
 - Bankruptcy, liquidation, delisting under financial pressure
- Continuous-time versus discrete-time
- Expanded sample - industry heterogeneity
 - Extension of Chava & Jarrow (2004)



The Relative Risk of Failure

- *Relative* – the failure intensity compared to all other firms at that time
 - *Failure intensity = baseline failure intensity*
× relative risk function
 - Focus on firm-specific effects, and excludes common effects (e.g. macroeconomic influences)
 - Ideal for identifying industry sector differences without explicit measure
 - Is a generalisation of an absolute risk of failure



The Covariates

- Return in excess of relevant index (return)
- Firm equity value relative to total index (size)
- Standard deviation of daily returns (volatility)
- Working capital / total assets (WC/TA)
- Retained earnings / total assets (RE/TA)
- Earning before interest and tax / total assets (EBIT/TA)
- Market equity / total liabilities (ME/TL)
- Sales / total assets (SALES/TA)
- Net income / total assets (NI/TA)
- Total liabilities / total assets (TL/TA)
- Current assets / current liabilities (CA/CL)



Design – Simple Model

- US Data
 - 1962-1999 inclusive
 - AMEX and NYSE (exc. financial industry firms)
- Estimating the coefficients for each covariate
 - Fitted on 1962-1990 for out-of-sample testing between 1991-1999
- Sources: CRSP and Compustat



One Year Forecast - Results

- Predictors of Failure

- Optimal Model:

- return, size, WC/TA, EBIT/TA – decrease intensity
- volatility – increases intensity

- Under previous studies (Shumway, 2001):

- NI/TA, TL/TA instead of EBIT/TA and WC/TA

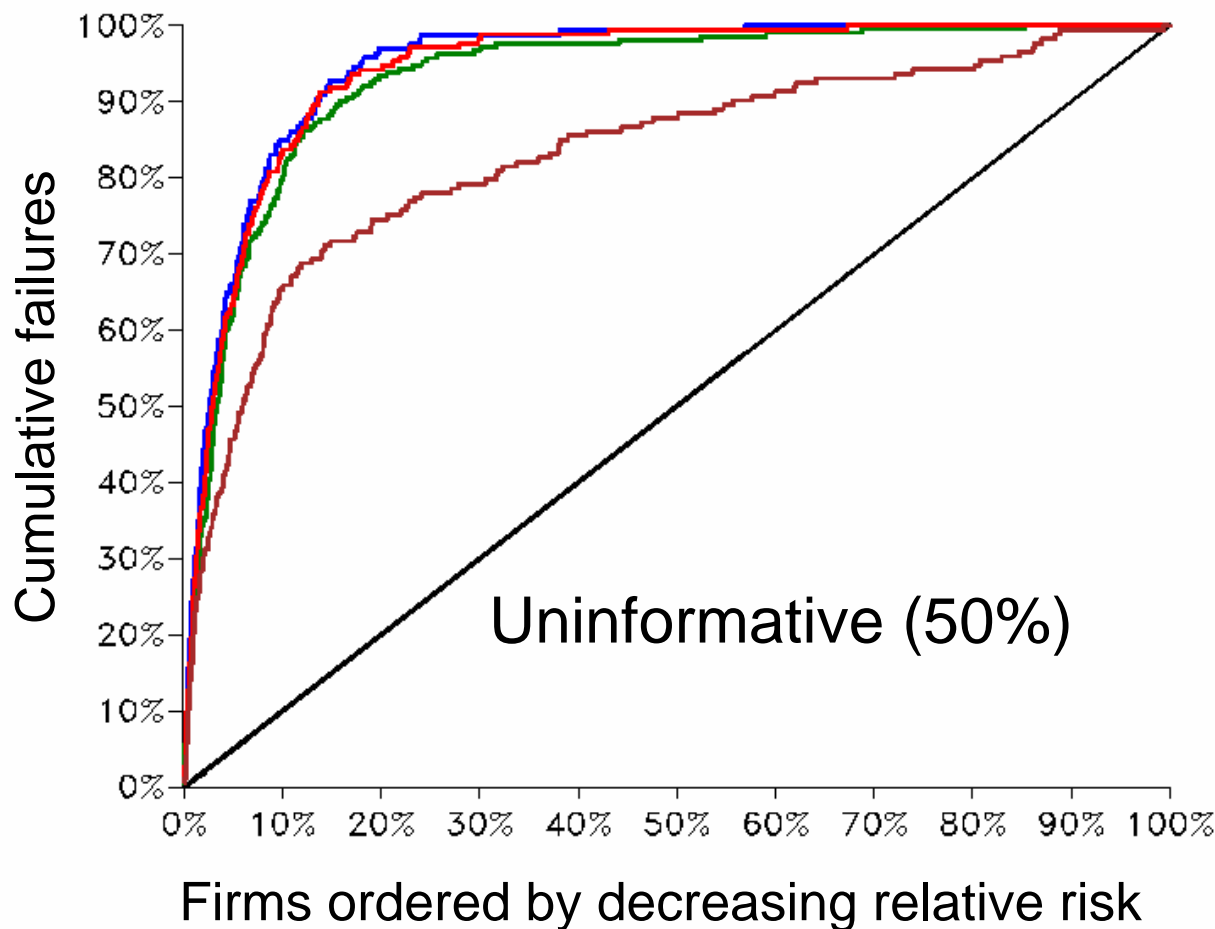
- All market covariates relevant in market model

- If only accounting ratios are fitted:

- EBIT/TA – decrease intensity
- TL/TA and SALES/TA – increases intensity



One Year Predictive Power



Optimal (94.84%):
return, size, volatility,
WC/TA, EBIT/TA

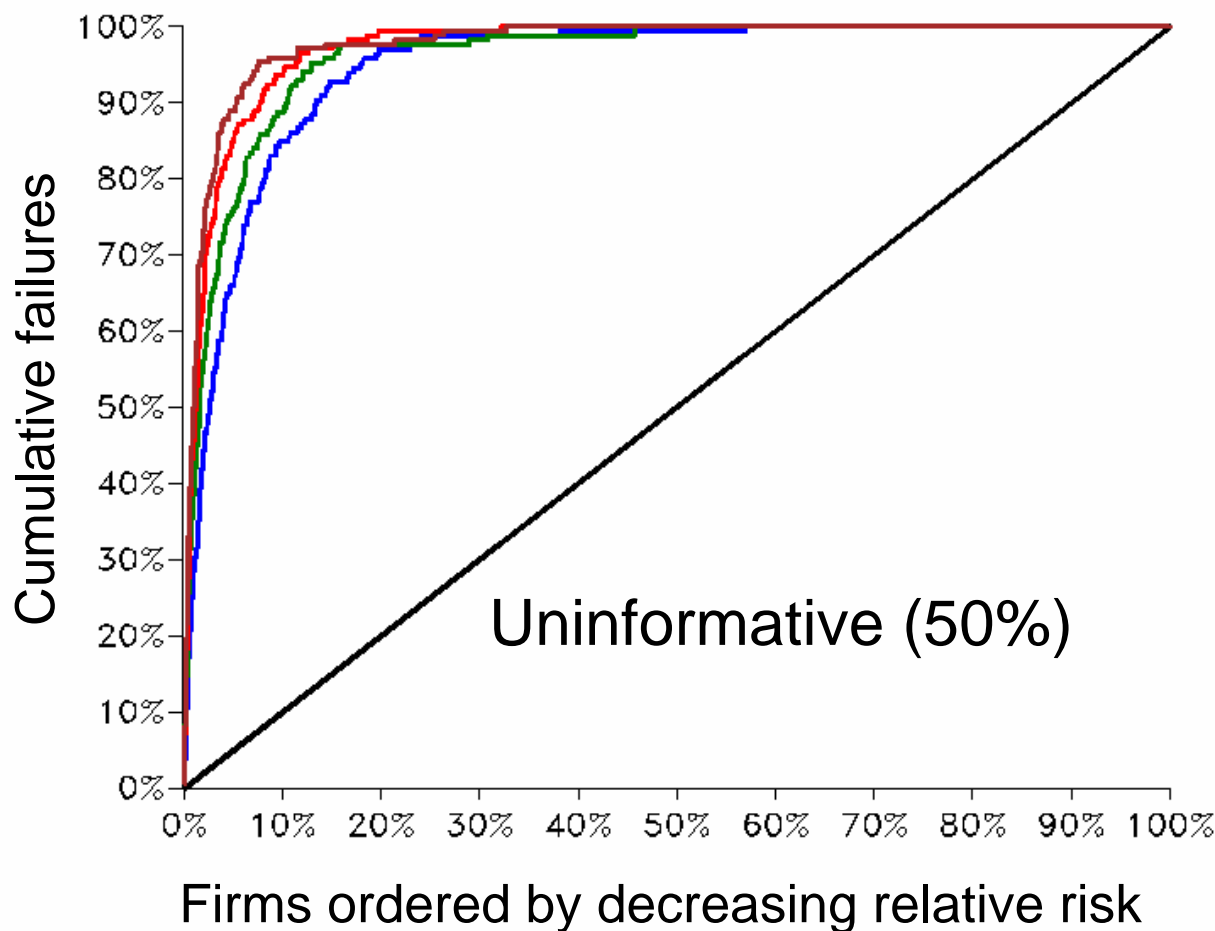
Shumway (94.31%):
return, size, volatility,
TL/TA, NI/TA

Market (93.17%):
return, size, volatility

Accounting (83.24%):
EBIT/TA, TL/TA,
SALES/TA



Short Term Predictive Power



1 month (97.92%):
return, size, volatility,
WC/TA, EBIT/TA

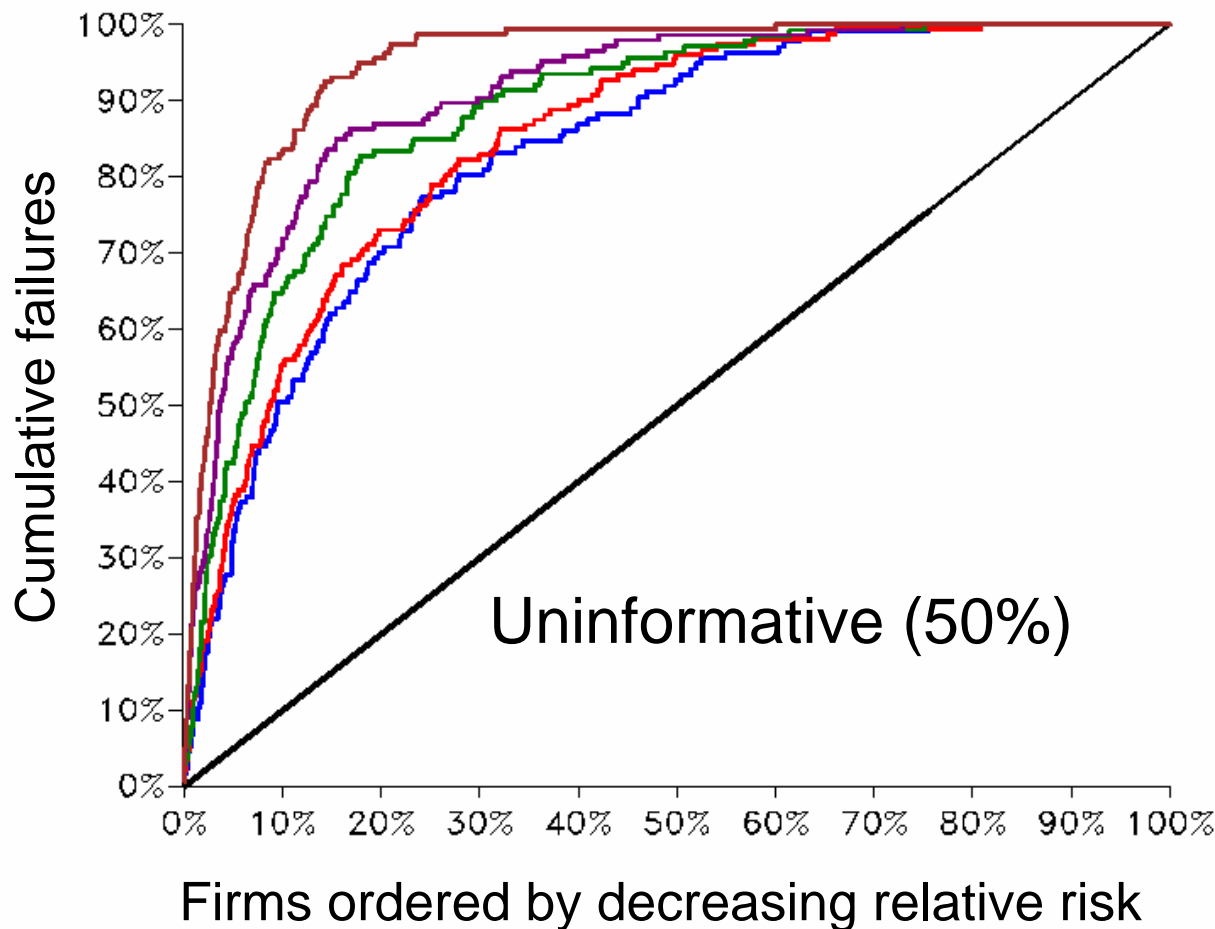
3 month (97.32%):
return, size, volatility,
WC/TA, EBIT/TA

6 month (96.09%):
return, size, volatility,
WC/TA, NI/TA

1 year (94.84%):
return, size, volatility,
WC/TA, EBIT/TA



Long Term Predictive Power



1 year (as previously)

2 year (90.93%):
return, size, volatility,
TL/TA

3 year (88.41%):
return, size, volatility,
TL/TA

4 year (83.98%):
return, size, volatility

5 year (83.39%):
size, volatility



Design – Expanded Sample Model

- AMEX, NYSE and NASDAQ (inc. financials)
 - EBIT/TA, WC/TA and CA/CL no longer fitted
- Industry Groups
 - IND1: Finance, insurance and real estate (15%)
 - IND2: Transport, communication and utilities (8%)
 - IND3: Mineral and manufacturing (38%)
 - IND4: Agriculture, construction, trade and services (39%)
- Industry heterogeneity – proportional?
 - Industry indicators vs. different baseline intensities



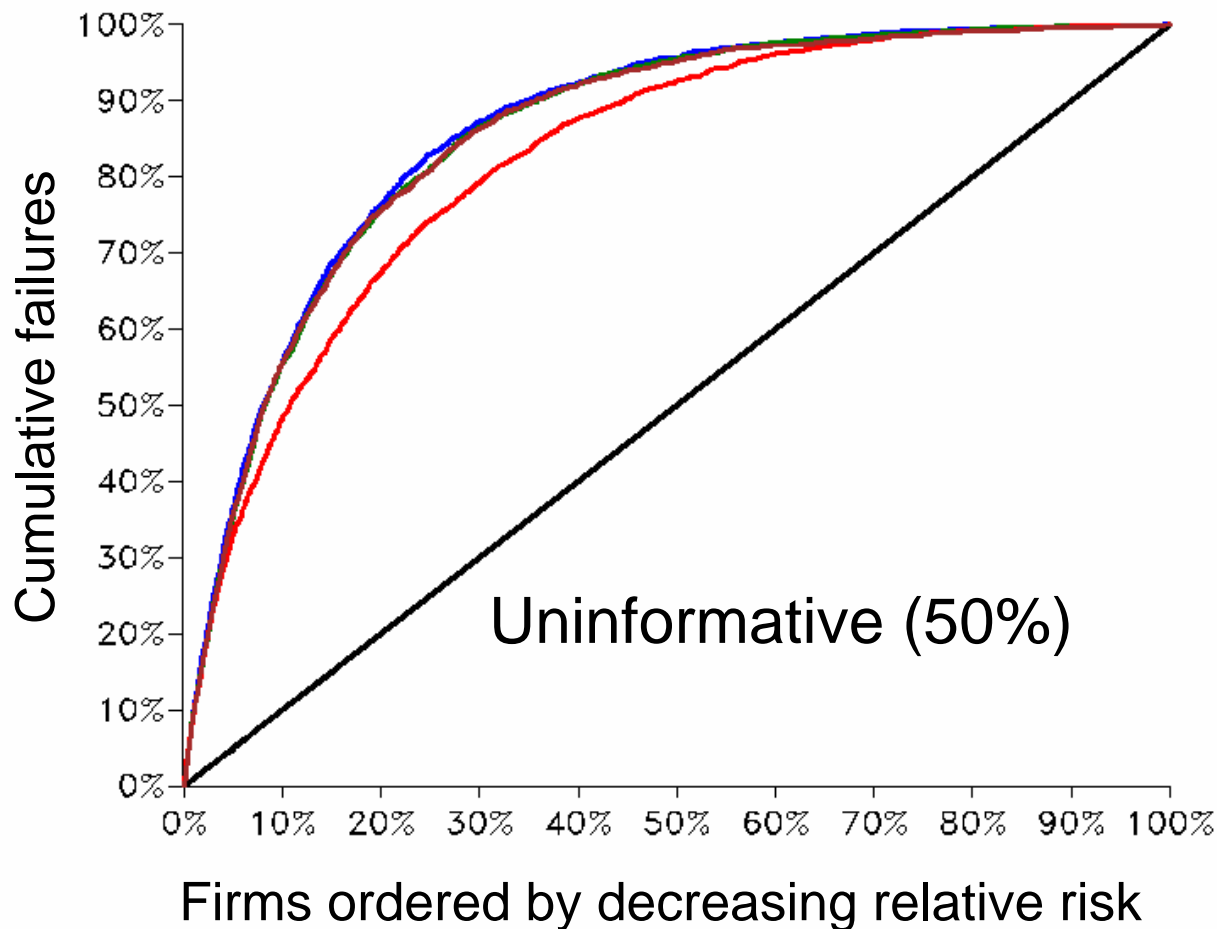
One Year Forecast - Results

- Predictors of Failure

- Industry distinction gives us very different results
 - return, size, NI/TA, ME/TL, SALES/TA – decrease intensity
 - volatility, TL/TA, RE/TA – increase intensity
 - With industry indicators, IND1 and IND3 decrease intensity
- IND2 and IND4 have very similar failure intensities
- With coefficients varying between industries:
 - return, volatility has greater impact in IND1, and size has less
 - Impact of RE/TA and SALES/TA is opposite in IND1!
- Non-proportionality is a concern in ME/TL, IND1 and IND3
 - Thus different baseline intensities preferred



One Year Predictive Power



return, size, volatility,
NI/TA, TL/TA, RE/TA,
ME/TA, SALES/TA

Industry indicator
covariates (86.22%)

... with varying
coefficients (82.58%)

Baseline intensities
differ between
industries (85.77%)

... with varying
coefficients (85.63%)



Conclusions

- The multiplicative intensity process provides improved performance of previous research
- Predictive power decreases as forecast length increases
- Relative measure is intuitively desirable and experimentally superior
- Good scope for future research:
 - Baseline intensity process
 - Australian data



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