
Portfolio Credit Risk Modeling: A Regulatory Perspective on the State of the Art

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Disclaimer: The views expressed are my own and do not necessarily reflect those of the Board of Governors or its staff.

Overview

- Practitioner models of portfolio credit risk have both drawn from and inspired academic research.
- Basel II process has drawn regulators into the dialog.
 - Breakdown of Basel I and consequent drive for risk-sensitivity in regulatory capital led to adaptation of practitioner models for Basel II.
- Portfolio credit risk modeling has reached the toddler stage. The tyke can walk nicely, but doesn't always watch for the cars. Regulators' dilemma:
 - interference can stifle natural development,
 - but really worried about disaster on the street.
- Areas where regulatory concerns point to flaws in industry practice and seems to be stimulating new research.

Recovery Risk:

Neglected Step-Sister of Default Risk

- Recovery following default treated as an afterthought in widely-used VaR and pricing models.
- VaR models assume recovery is fixed ex-ante or that uncertainty in recovery idiosyncratic.
 - For moderately large portfolios, any idiosyncratic source of risk is diversified away, so has negligible impact. Only expected recovery matters.
- Same assumption imposed implicitly or explicitly in most pricing applications whenever recovery rate is made time-independent and set to historical average.
 - Implication: post-default market price should equal expected NPV of future cashflows. No risk-premium -- discount at the risk-free rate!

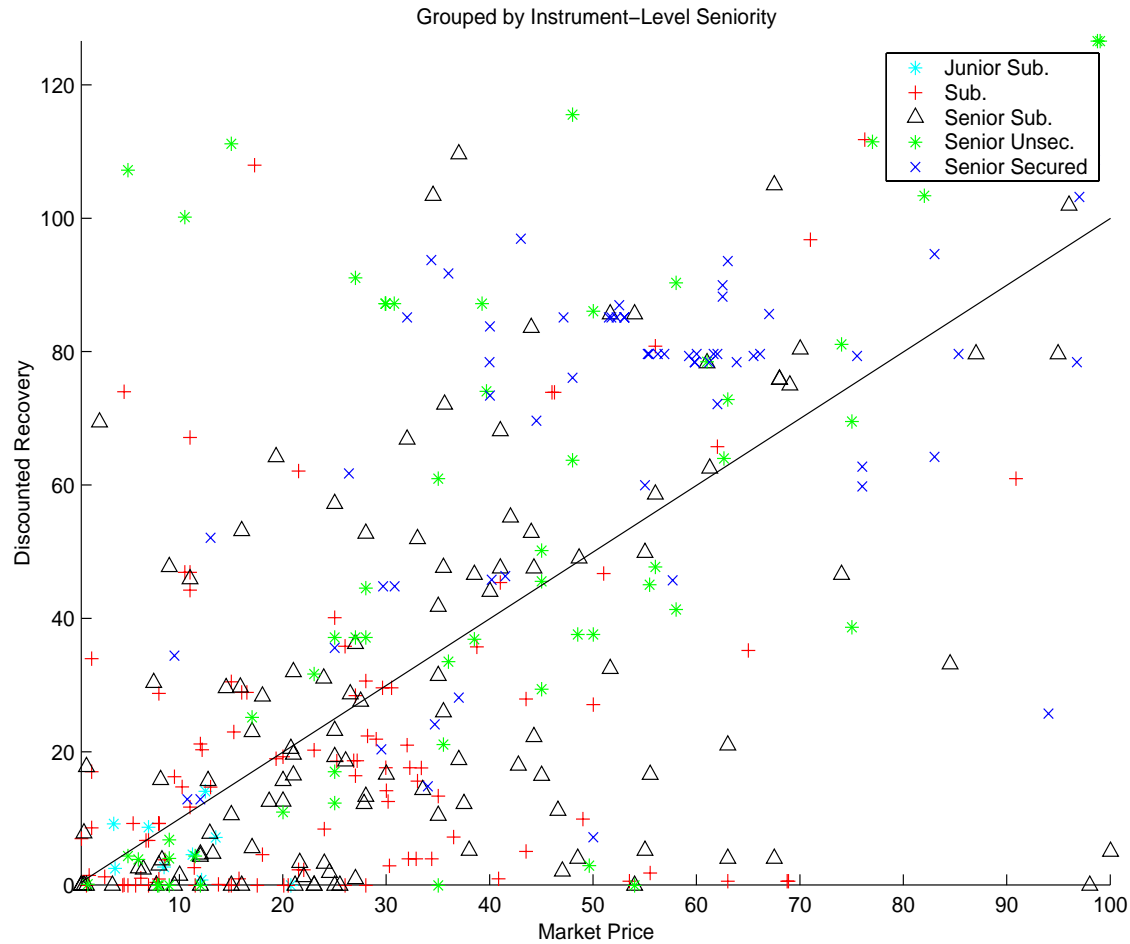
Accumulating Evidence of Systematic Risk

- Data on post-default bond prices suggest negative correlation between annual default rates and average recovery.
 - Frye in *Risk* (2000, 2003)
 - Altman, Brady, Resti, Sironi in *J. Business* (forthcoming)
- VaR understated in current models. Need to extend models to allow systematic risk factors to influence recoveries. Examples:
 - Pykhtin (*Risk*, 2003) for extended CreditMetrics;
 - Bürgisser, Kurth and Wagner (*J. Risk*, 2001) for extended CreditRisk⁺.
- Calibration is a challenge with current data.

Improving the Quality of the Data

- If there is systematic risk in recoveries, what is the correct discount rate for taking NPV?
 - Practitioner convention has been to use instrument's contractual yield to maturity. Convenient but illogical.
- Are post-default bond market prices reliable?

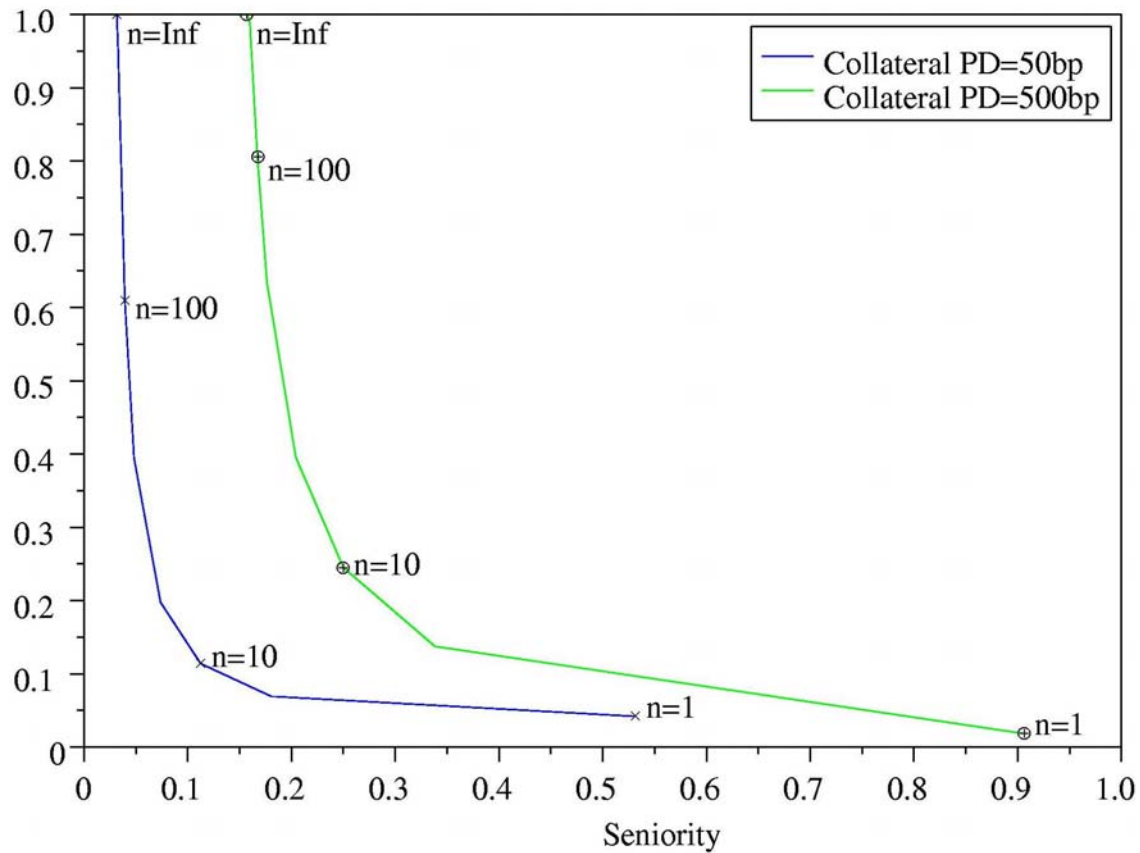
Market Price vs Discounted Cashflows



Capital Treatment of Securitizations

- Accommodating CDO tranches in portfolio VaR very hard to do correctly. Must unbundle the CDOs.
 - Custom model of cashflow waterfall in each CDO.
 - Jointly model rating changes for collateral pool obligors and portfolio obligors. Conditional on outcomes at horizon, re-price CDO tranche using, say, Duffie and Garleanu (FAJ, 2001).
 - Peretyatkin and Perraudin's *Credit Explorer* is a step in this direction.
 - In many cases, some investors lack access to identities of pool obligors.
 - Tranche of a CDO of CDOs gets really nasty.
- Until recently, bank capital systems typically treated CDO tranche equivalently to a whole bond of the same rating.
- For all but highest-rated tranches, Basel II (CP3) proposes vastly higher capital charges on CDO tranches than on whole loans.
 - Deduction below Ba3/BB-.
 - Some industry analysts have objected, arguing for “equal treatment for equal risk.” A BBB is a BBB is a BBB, no?

Capital for Thin Baa3-rated CDO Tranche



Capturing the Key Determinants of Risk in a CDO Tranche

- Key insight is that pooling within securitization concentrates the systematic component of risk. Increases (sometimes decreases) capital relative to comparably-rated whole loan depending on tranche rating and # obligors.
- Basel II proposed treatment of securitization based on rigorous but highly stylized models that capture this concentration effect.
 - Pykhtin and Dev (2002, 2003) for RBA, Gordy and Jones (2003) for SFA.
 - These models are “default-mode.” Losses due to default are allocated to the prioritized investors, but rating-changes have no effect on value of tranche.
 - Pool income and interest payments to tranches are ignored.
 - Simple approaches adequate for portfolios with small share of CDO investments.
- Banks with significant investment in mezzanine tranches need to develop more sophisticated approaches. “Theory” is straightforward, tractability is not.
- At a minimum, we must recognize that rating is not a sufficient statistic for capital. Need to know collateral characteristics such as # obligors and average pool credit quality.

Procyclicality

- Both Basel II and economic capital are *procyclical*: Required capital tends to increase in recession, fall in expansion.
- Public policy concern: Preserve traditional role of banks as “shock absorbers” for the market economy.
- Lively debate on estimation of procyclicality in Basel II and policy options for dampening (Kashyap & Stein, 2004; Gordy & Howells, 2004).
- Management concern: Capital planning and RAROC performance evaluation favor stability.

Diagnosis?

- Might the models overstate procyclicality?
 - Rating as insufficient statistic for term-structure probability?
 - Say firms are rated by one-year default probability.
 - Introduce firm-specific mean-reversion in leverage ratio.
 - Then, aggregated to grade-level, term-structure of default probability would twist clockwise in recession, counter-clockwise in expansion.
 - Current rating-based models (e.g., CreditMetrics) assume time-homogeneous Markov rating process, so may overstate sensitivity of loan MtM values to business cycle.
- Might “economic capital” be misspecified?
 - Longer horizon than one year?
 - Time-varying target solvency probability?