Risk Premia in Loan Markets

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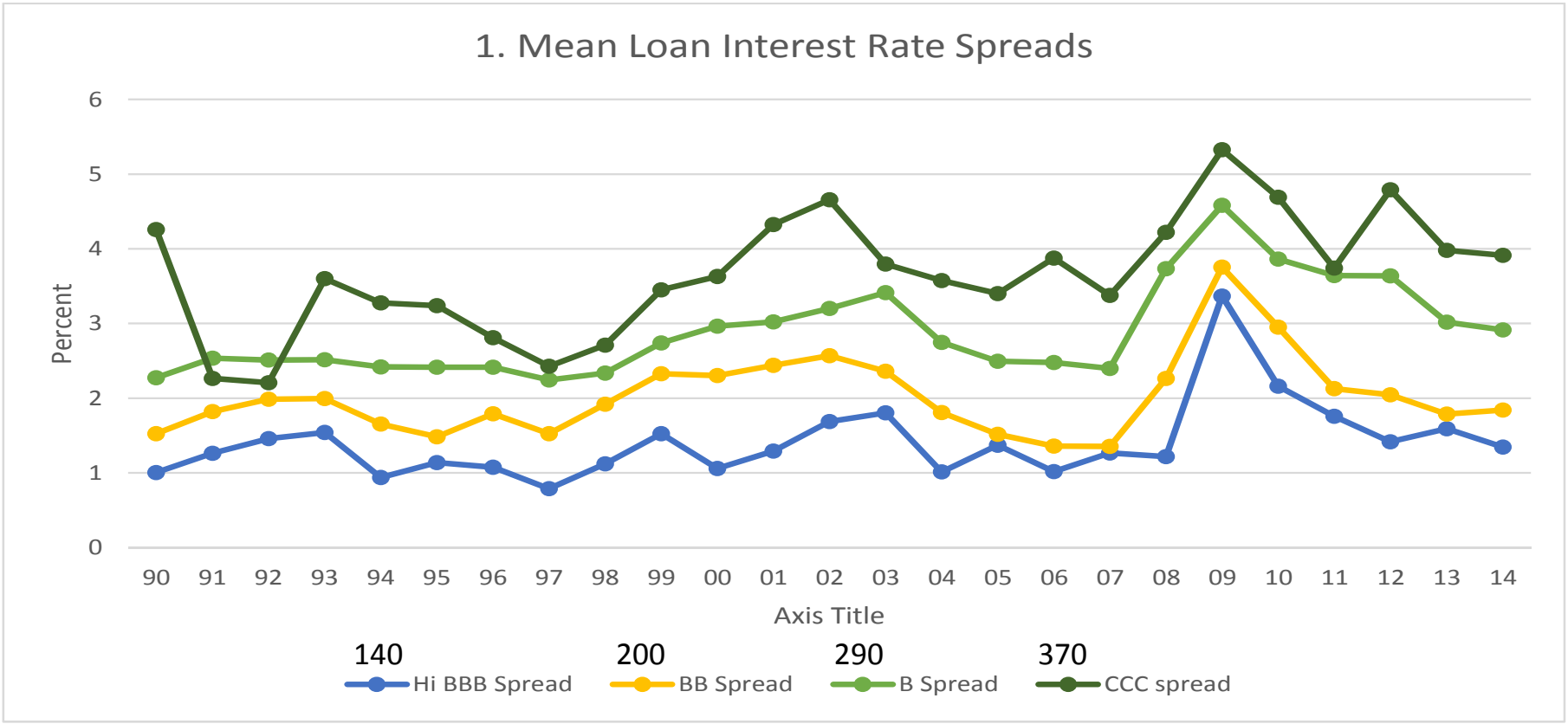
Remarks and slides are Carey's opinions, not the opinions of the Federal Reserve.

Goal: Understand this chart (better)



Understand What?

- Absolute levels of spreads
- Relative levels
- Time variation
  - Cyclicality
  - What's different post-crisis?

- What kind of spreads?
  - Corporate loan contract spreads over LIBOR at issuance

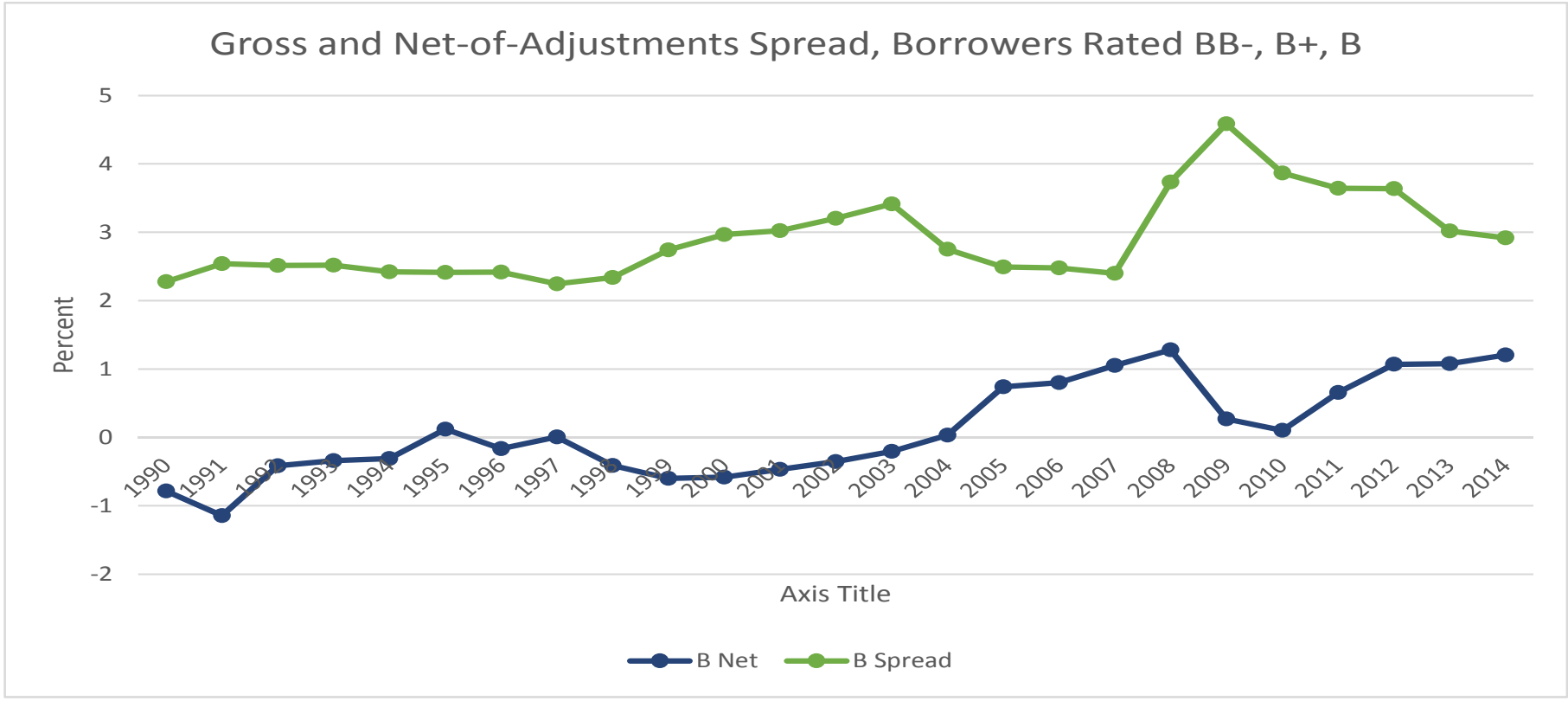
Credit Spread Puzzle

- Why are corporate (bond) spreads so high?
  - Ratio of risk-neutral (spreads) to physical (EL) is far above 1.
- For example Elton et al (2001); Collin-Dufresne et al (2001); Huang & Huang (2002); Driessen (2005); Tarashev & Zhu (2006); Hull, Predescu & White; Cai Helwege Warga (2007); Berndt et al (2008); many more
- Many papers depend on (and reject) a particular model of credit risk
- Suggested components of spread
  - Expected loss
  - Credit risk premium (unexpected defaults; spread vol; contagion
  - Illiquidity
  - Taxes
- Many other related literatures, e.g. PD estimation (Leland 2004; Bharath & Shumway 2008); portfolio credit risk (Gordy 2003); etc.

Ugly

- No model, just intuition
- Perhaps inconsistent at some points in the analysis
- Sometimes round numbers
- Can we get close to a complete explanation?

Answer: Yes (a sample)



For B-rated, on average, 10 bps, or a ratio of .67 (net to EL), remains, with some cycle

Why loans?

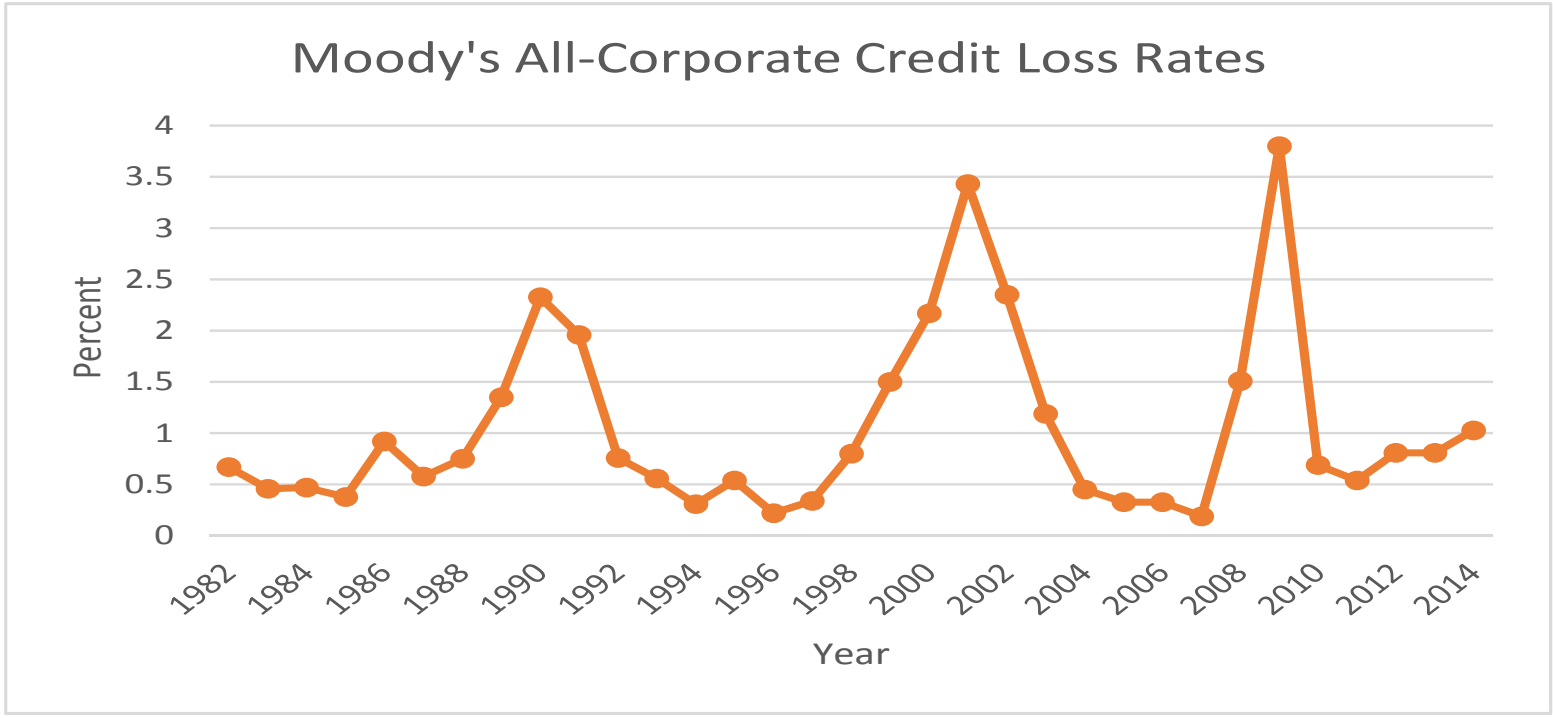
- Floating-rate instruments, so almost no interest-rate risk, no tax effect
  - If no credit risk, price should remain at par throughout life of loan
- We can avoid all of the usual term structure and interest rate process machinery that is needed for bonds
  - I'll ignore discounting effects on credit losses – small relative to the contract interest rate spread
- Liquidity may be different than for bonds. Few loans are "very" liquid.
  - Even trading through a dealer, T+20 settlement, and many with no quotes
  - Ignore market value variation after issuance
- If the answers are different for loans and bonds, it implies a need to reconcile the differences, because both are debt liabilities of a firm

Background: Institutional

- New-issue loan contract spreads
  - Spread is written in the contract; loans are issued at par.
- Floating-rate loans
  - Interest rate reset to LIBOR+spread, usually quarterly
- Prepayable without penalty
  - Time variation in market spreads likely to affect issuance decision
  - It's all wrong-way credit risk...I don't analyze it in this version
    - Borrower's quality improves…borrower refinances to get the lower spread
    - Borrower's quality deteriorates…borrower sticks with the contract
- Only U.S. term loans. Average five-year maturity.
- Complication I'll ignore: Performance pricing grids

Key Fact: Defaults cluster, in bad states

About half of default events occurred in just six bad years



Key Fact – implications

- Rule out zero risk premium
- Default events are NOT unconditionally independent
  - MAY be conditionally independent, but the state-of-the-world conditioning variables will be important
- Conditional expected-loss seems sensible

Decompose the observed spread

- Spread =

  Expected default loss component +

  Risk premium for states of the world in which expected defaults occur +

  Risk premium for unexpected default loss component +

  Premium for illiquidity +

  Remainder

- Pastiche of assumptions, intuition
  - Note: No market risk here…investor assumed indifferent to variation in price of loan after issuance

Data

- LPC Dealscan for loans (U.S. term loans only), and Moody's ratings
- Michael Roberts' match of Dealscan to Compustat
- Borrower's S&P rating at issuance from Compustat
- Moody's KMV EDFs
- LPC/LSTA secondary market number of dealers with a quote (liquidity)
- 1990-2014 (1998 on for LSTA)
- 7426 loans

Buckets

- Severity of credit spread puzzle varies with degree of default risk
- Aggregate loans into four groups by rating after issuance (so only loans to rated obligors)
  - BBB+, BBB (call it “BBB”)
  - BBB-, BB+, BB (call it “BB”)
  - BB-, B+, B (call it “B”)
  - B-, CCC+ (call it “CCC”)
- If two ratings and they differ, use the riskier
- Drop A-rated and better, not enough observations per cell

Step 1a: Expected Loss (EL) Component

- Unconditional: Use the one-year EDF for PD (for availability, similar to annualized five-year EDF where available)…permits EL to vary
- But borrower compensation should take into account that half of expected default events occur in very bad years…multiply by 1.5
  - Crude: X=PD*LGD is good-year EL compensation; half of defaults are in bad years; aX is bad-year compensation; a=2 from equity risk premium ratio (Damoradan); thus EL=X(.5+.5a)=1.5X
- Multiply by long-run average loan recovery rate of 75 percent.
  - Loan-bankruptcy-year dummies in Carey & Gordy (2015) never significant at 5 percent level

Step 1b: EL Results (orange is what's removed)

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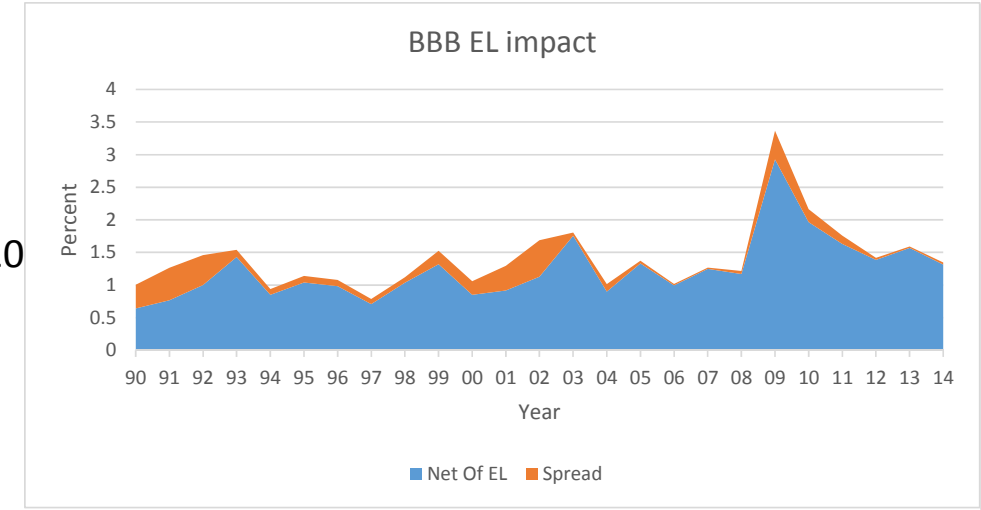

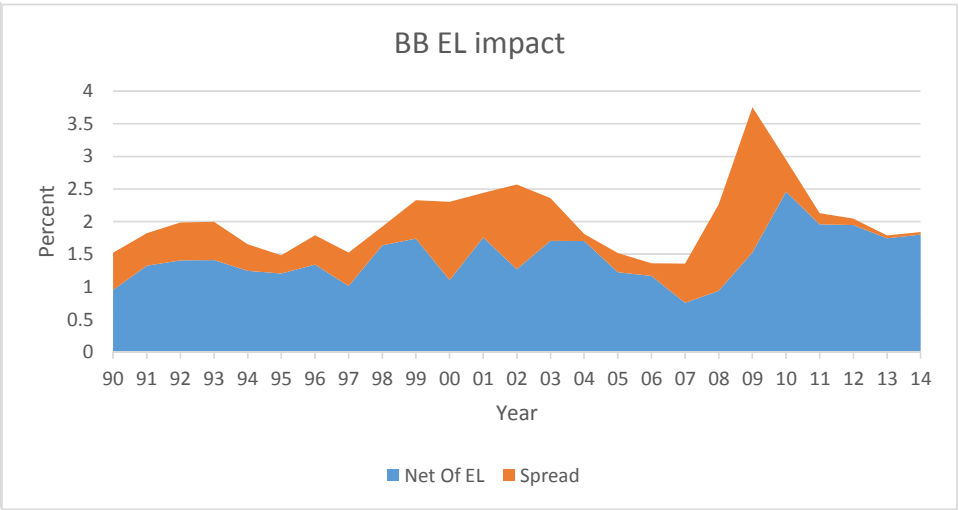

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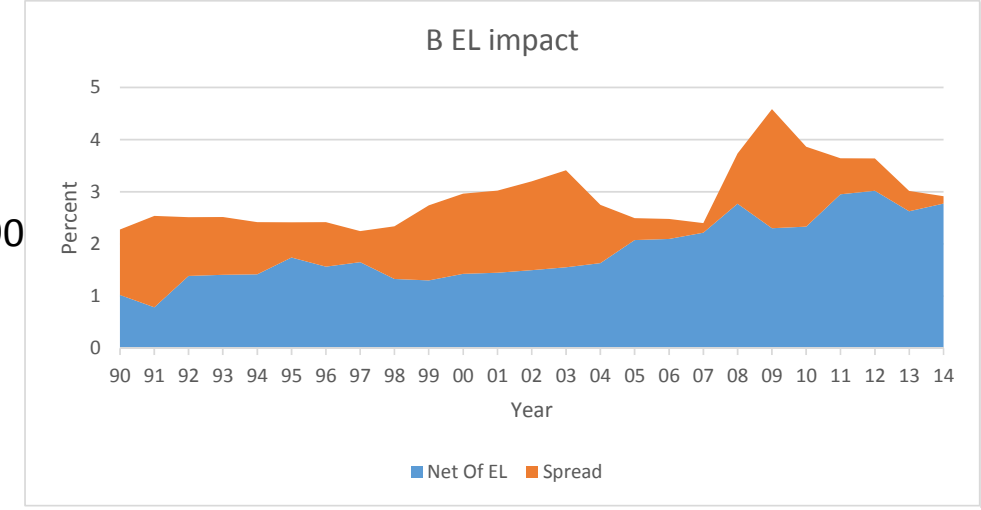

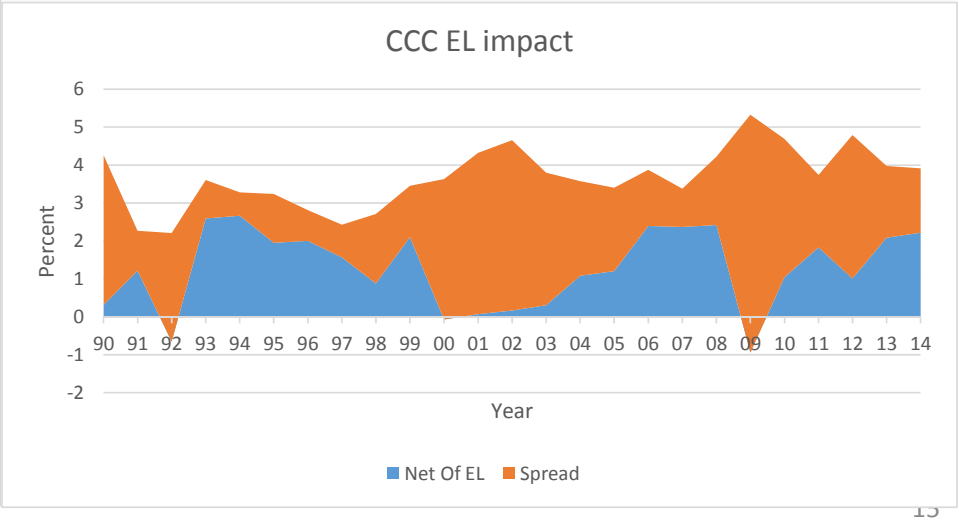

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Step 1: Comments

- Standard credit-spread-puzzle result: EL explains more the riskier the portfolio
  - Almost nothing for investment-grade
- My bad-year multiplier matters for CCC, but not much for BBB

Step 2a: Liquidity and risk premium hints

- Regress residual spread from step 1 on:
  - Liquidity: 3 indicators: 0 quotes, 1 quote, 2-3 quotes (omitted is 4+ quotes)
    - "Quotes" is max number in the year beginning 3 months after issuance
  - Equity capital allocation to loan based on Gordy ASRF model
    - With relatively high asset correlation (0.25) and very high percentile (99.999).
      - Makes the (large) portfolio almost risk-free.
    - PD and LGD are other inputs. Using EDFs and (1-75)=25%.
    - What's the price per unit?
  - Indicator for "Term Loan B"…these institutional tranches have higher spreads.
- Result (units are bps):

NetOfEL = 98 + 51*TLB + 550*Capital + 14*Q0 + 39*Q1 + 25*Q23

Step 2b: Comments

- 50 bps premium for TLB corresponds to anecdotes years ago
- Equity premium (cost per percent of equity) of 5.5 percent is close to view years ago that equity premium is about 6 percent
  - Note: Many estimates are available that are not 6 percent
- Liquidity premium results are a bit wacky
  - Why do no-dealer-quotes loans attract a smaller spread than 1-3 quotes?
  - Perhaps those investing in no-quotes loans think they are immune to mark-to-market risk (that is, they can fair-value using a model without danger of being challenged by auditors)?
  - I will assume 50 bps as constant illiquidity premium for no-quotes loans (and 40 bps, 25bps, and 10 bps for 1-quote, 2-3 quote, and 4+ quote loans)
  - Needs more investigation

Step 3: Risk premium (unexpected defaults)

- Multiply allocated equity capital by 5.5 percent cost-of-capital.
- Almost surely, any excess of default losses above already-bad-state-adjusted expected losses would occur in a very bad state of the world.
  - Equity is more expensive in bad states.
  - Apply a multiplier of 2 (as for EL, Damoradan equity premium is twice as high in bad years).
  - Later: Apply a multiplier for 2010 that is loan-issuance-year equity premium relative to average

Step 3: Risk Premium Results

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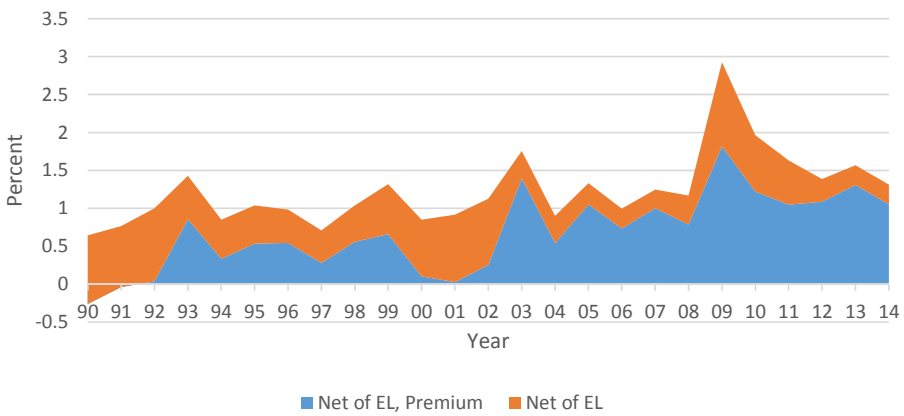

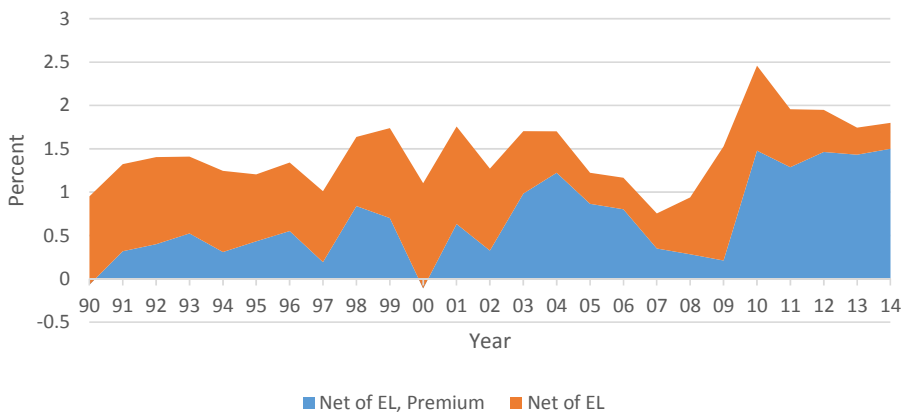

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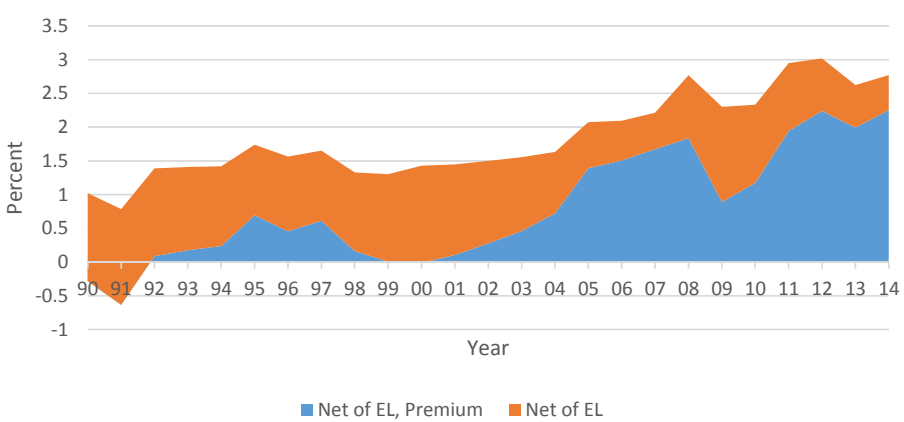

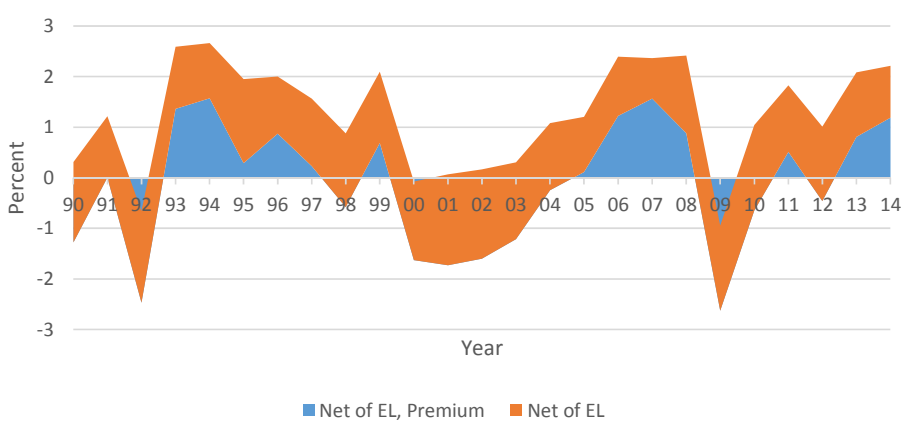

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Step 3: Comments

- Bigger than EL for safer loans, smaller for the riskiest
- Not enough to explain the whole spread (except maybe for CCC)

Step 4: Liquidity Premium (and TLB)

- As noted, subtract 50 bps from TLB instruments
  - Could add 50 bps to non-TLB…ad hoc…why the difference?
- About 60 percent of loans have no quote, remainder are spread evenly across categories
  - Subtract 50 bps illiquidity premium from no-quotes loans, and 40 bps, 25bps, and 10 bps for 1-quote, 2-3 quote, and 4+ quote loans, respectively

Step 4: Liquidity Premium Results

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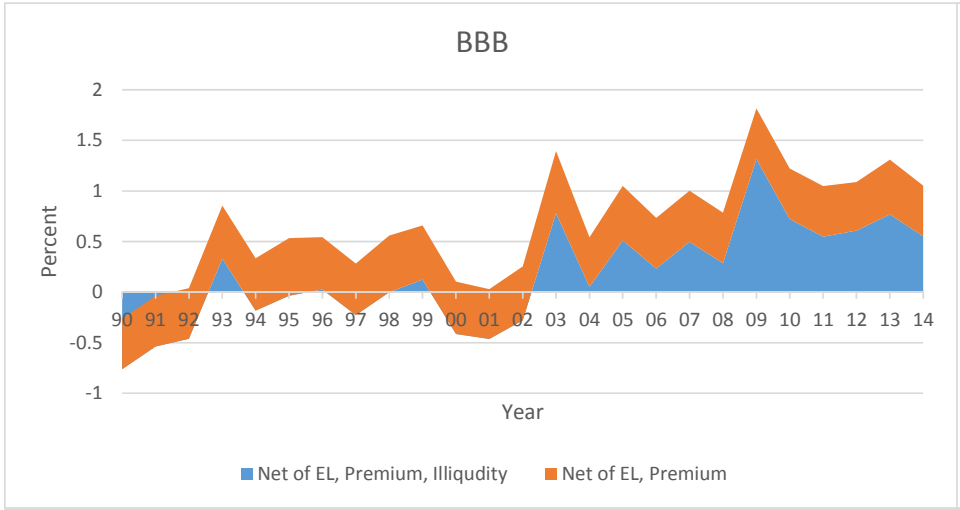

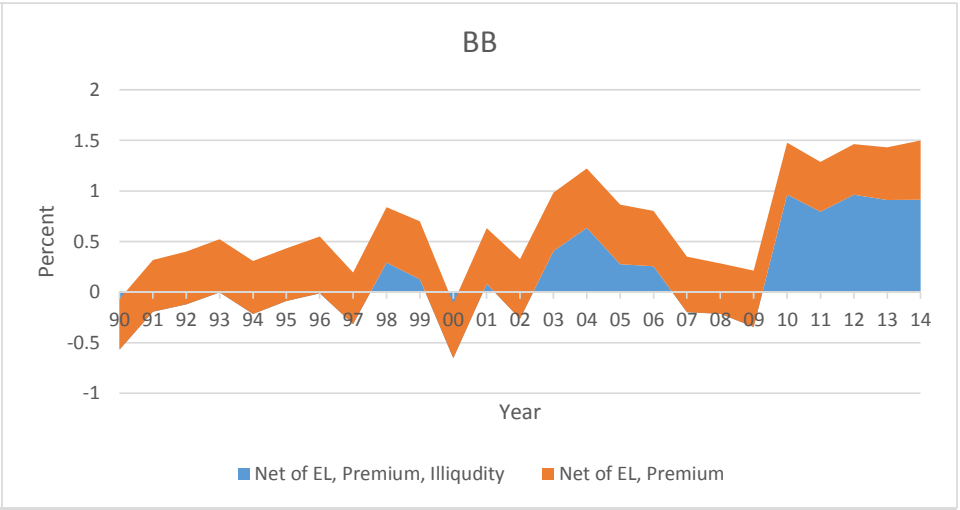

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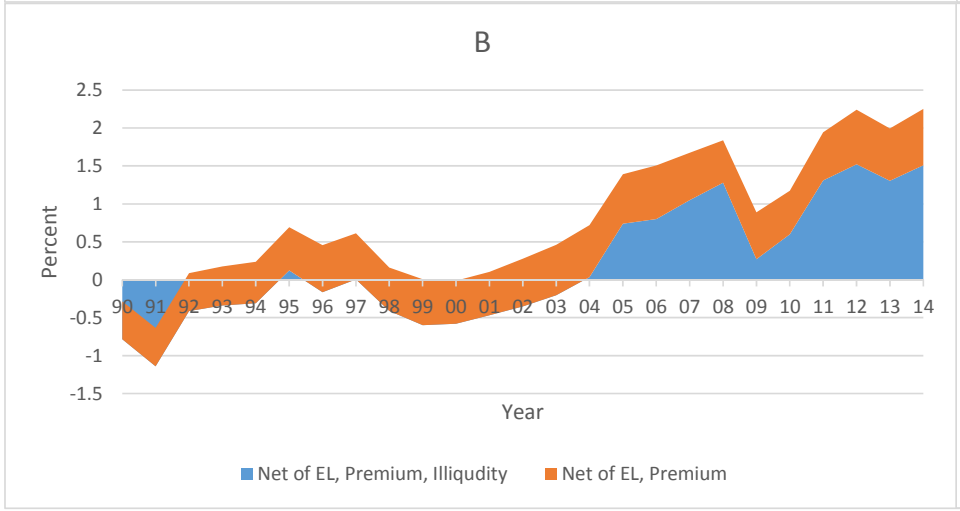

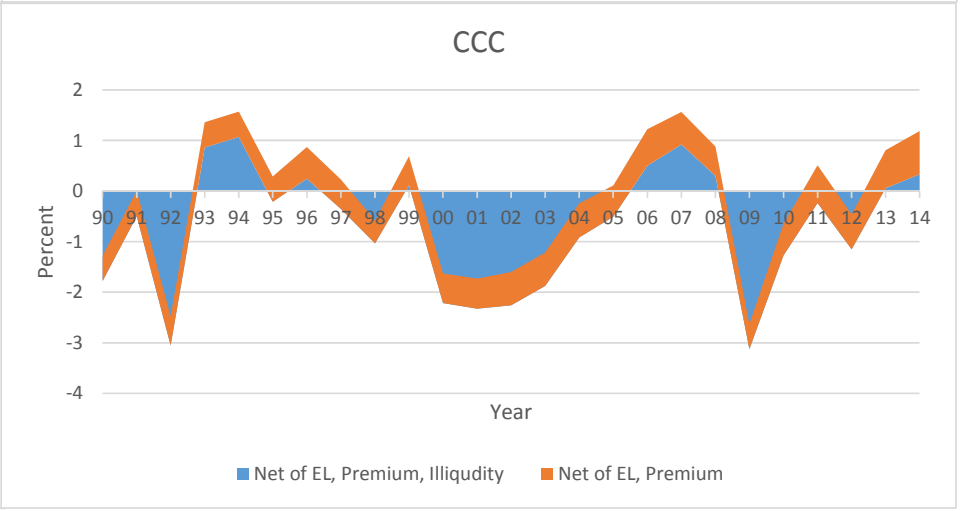

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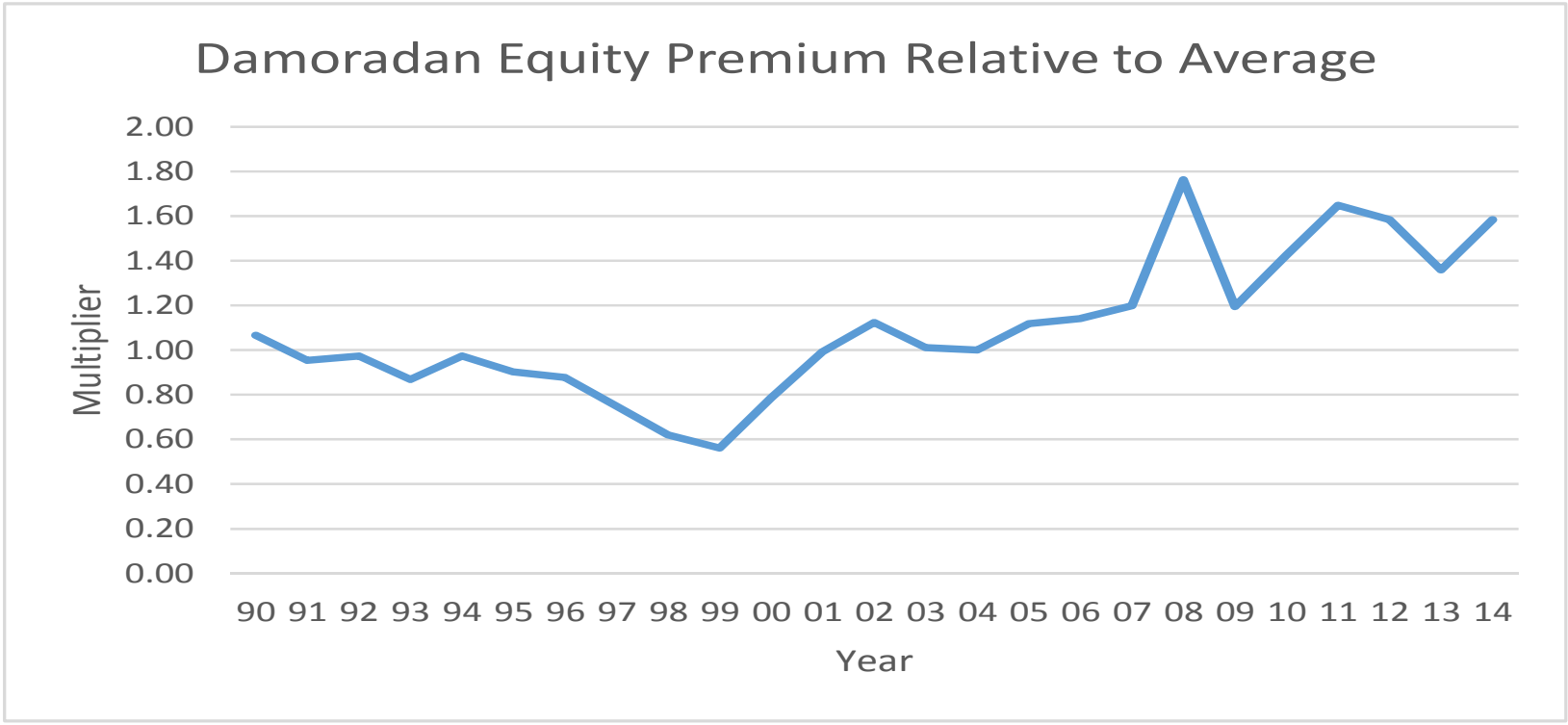
What's Different Since 2010? Partly higher EP



Step 5: With post-2009 EP multiplier on allocated capital

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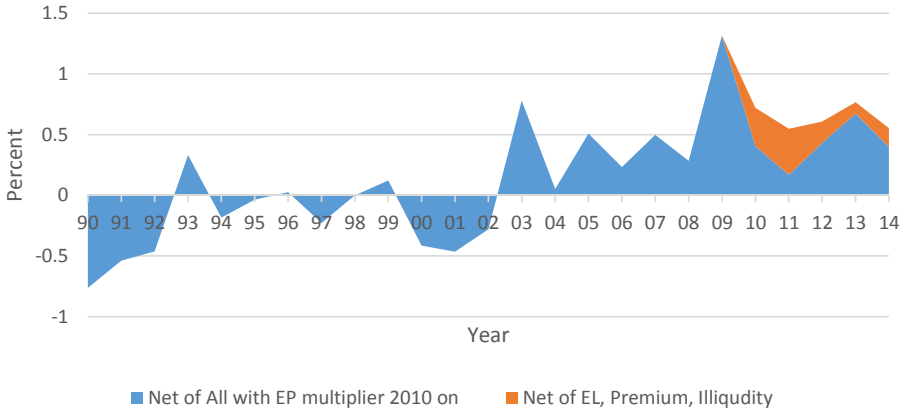

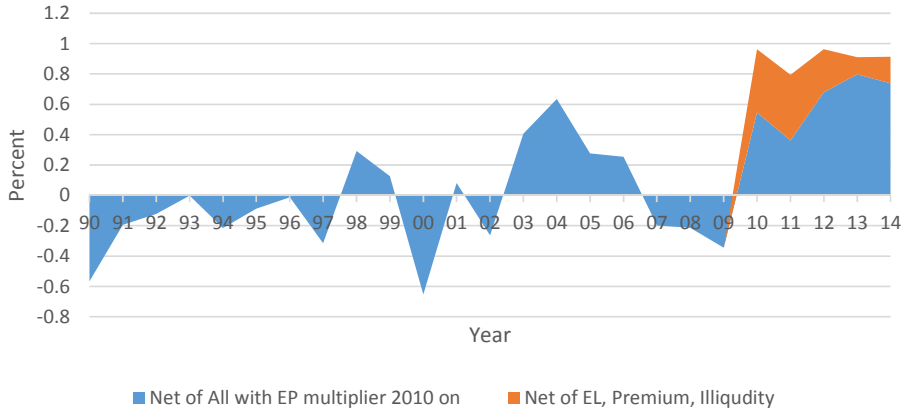

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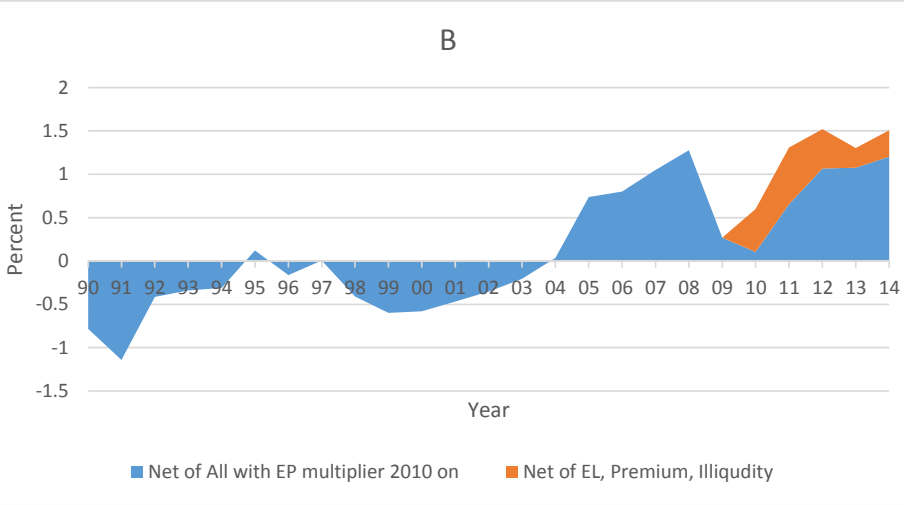

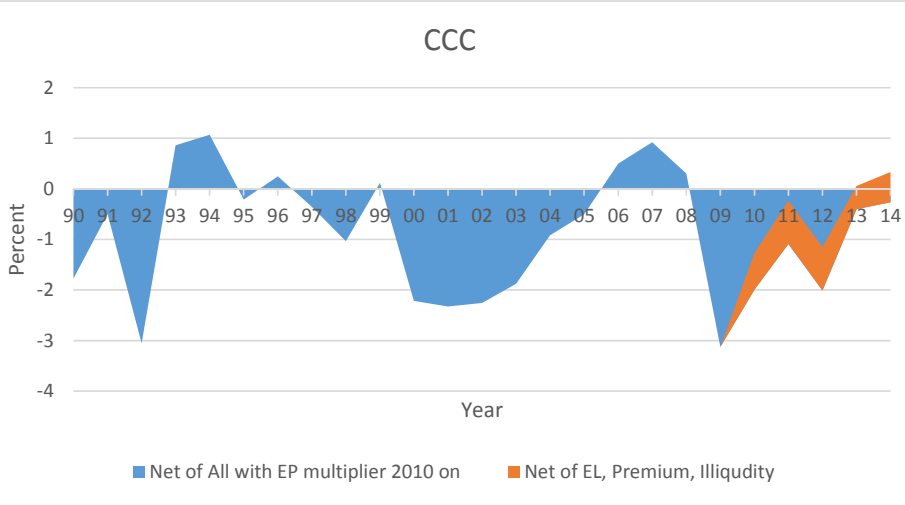

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What Remains “Unexplained”?

- Sample average residual spreads
  - For BBB, 11 bps of 140
  - For BB, 8 bps of 200
  - For B, 10 bps of 290
  - For CCC, -88 bps of 370
- As a ratio of EL: 1.0, 0.7, 0.6, -0.1

Concerns

- Very ad hoc
- Where does the TLB 50 bps come from? Should it be subtracted?
- Model-dependent results: Gordy ASRM is imperfect
- Some of the credit spread puzzle is just pushed down to the equity premium puzzle
  - The treatment of very-bad-year cost of risk is particularly ad hoc
  - Why is the long-run average equity premium high?
- Sample selection during bad years, especially for CCC issuers
  - Many of those issues might be hidden forbearance, thus negative residuals

Benefits

- Dispense with term structure machinery
  - Almost-pure credit and liquidity risk
- Spreads are mostly “explained”
- Maybe provides some intuition to guide modeling

What's Different Post-Crisis (post pre-crisis)?

- Big positive residuals for all but CCC, roughly 2010-2014. Why?
- Should not just be that the equity premium is relatively high. A multiplier was applied for that.
- Do investors believe expected losses are much higher?
  - Agency default rates were about as bad in 2009 as in 2001. What would be the basis for such a view?
- Do they believe bad-states will be much worse in the future? Why for credit risk in particular, and not equity?
- QE? But that should push spreads down, not up.