Explaining the Level of Credit Spreads:
Option-Implied Jump Risk Premia in a Firm Value Model

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Overview of the paper

- Motivation: Several academic studies conclude that the observed credit spread is too wide (credit spread “puzzle”) compared to historical default losses.
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  - Option prices on S&P 100 index and its constituents.
  - Equity risk premium.
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- Key findings:
  - Incorporating jump risk premia (and calibrating them to options) is important to generate reasonable credit spreads.
Ambitious work

■ What they have done is daunting:
  ◆ Firm value process $\rightarrow$ credit spread on corporate bond.
  ⇔ Stock value as an option on firm value
  ⇔ stock option as a compound option on firm value
  ⇔ stock index as a portfolio of options on firm value
  ⇔ stock index options as options on a portfolio of options on the firm value.

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The model is very *detailed*, with convoluted linkages.

To make the calibration feasible, the model/calibration need to be *highly stylized*:

- Firm value dynamics are identical across different firms (same $\beta$).
- Static abstractions: constant volatility, constant arrival rate ...
- Static calibrations using cross-sectional and time-series averages.
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- Give and take: To build a detailed model and make calibration possible, the model/calibration need to be highly stylized.
Path to success

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- Where there is risk, there is a risk premium puzzle.
  - Stock market — equity risk premium puzzle.
  - Stock options market — jump risk premium puzzle.
  - Corporate bond market — credit risk premium puzzle.
  - Other markets: currency (forward risk premium), bond (term risk premium)...
  - Different markets, same complaint: (1) too large, (2) strongly time varying.
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- *Where there is risk, there is a risk premium puzzle.*

  - Stock market — *equity* risk premium puzzle.
  
  - Stock options market — *jump* risk premium puzzle.
  
  - (Defaultable) bond market — *credit* risk premium puzzle.
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⇒ Investors in different financial markets are largely consistent with one another, but might be inconsistent with the academia...
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Questions:
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Can I simplify the model structure a bit to make the estimation more dynamic and less stylized?
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■ If firms are identical, can we use a representative firm to arrive at the same conclusion?
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- Is it possible to calibrate firm value dynamics to stock options (and other info) on one firm (without dragging in stock index options)?
  - Index options are useful to identify the pricing of a market factor.
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- *What is causing what to jump?* Firm value = equity value + debt value.
  - Firm value jump → stock price jump, credit spread jump.
  - Stock price (market risk, perception of market risk) jump → firm value jump, credit spread jump?
  - (Perception of) credit risk jump → stock price jump, firm value jump?
An alternative framework

- Stock price jumps to zero whenever default occurs.
  - Stock option prices can be used to identify “risk-neutral” default intensity → implications for “out-of-sample” bond pricing.
  - It can be used to address similar questions: whether credit spread is consistent with stock option prices.

- Simplified linkage can accommodate more realistic dynamics:
  - Both default arrival and return volatility can be stochastic.
  - Leverage effect can be introduced through correlations between return and volatility.

- Pricing and model estimation are very simple and fast.
Bottom line

■ I love what they are doing:
  ◆ Linking one market to another (and showing consistency) is a proven path to success in explaining risk premium puzzles:
    The risk premium might be puzzlingly large, but it is no more puzzling than the puzzle in the other market.

■ I admire their ambition and effort:
  ◆ From firm value dynamics to stock index options involves many convoluted steps that need intelligence, patience, and hard work.

■ For future research, a lot more can be done on building the linkages.
  ◆ There does not exist a dichotomy between structural models and reduced-form models.
  ◆ Where to start (firm, debt, equity) depends on the objective of the paper...