Discussion of "Default Risk Premia and Asset Returns" by Antje Berndt, Aziz Lookman and Iulian Obreja

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Moodys - May 2007

- Summary
- Methodology
- Comments
- Theory
- Conclusion

Summary of the paper

- This paper constructs a Default risk premium factor (DRP), which measures the change in the *jump to default risk-premium* proxied by the difference between CDS-implied default probability and KMV-EDF.
- Tests whether factor helps price the cross-section of asset returns (in sense of multi-factor asset pricing model).
  - Equity
  - Bond returns
  - S&P 500 Put Option returns
- Finds evidence that the factors is priced for Bonds and Put options in addition to known Fama-French factors.
- Propose a theoretical framework to justify their results.

Constructing the DRP factor

- Estimate P measure default intensity from Moody's-KMV EDF data (historical default frequency) assuming: 1-year EDF of firm i equals $1 - p_i(t,1)$ where

$$p_i(t,T) = \mathrm{E}\left[\exp(-\int_t^T \lambda_{i,s}^P ds)\right]$$
$$d\log\lambda_{i,t}^P = \kappa_i^P(\theta_i^P - \lambda_{i,t}^P)dt + \sigma_i^P dZ_{i,t}^P$$

- Risk-Neutral measure intensity estimated from 5-year CDS spread (Markit) using risk-neutral pricing default probability for firm i$= 1 - p_i^Q(t,1)$ where

$$p_i^Q(t,T) = \mathrm{E}^Q\left[\exp(-\int_t^T \lambda_{i,s}^Q ds)\right]$$
$$d\log\lambda_{i,t}^Q = \kappa_i^Q(\theta_i^Q - \lambda_{i,t}^Q)dt + \sigma_i^Q dZ_{i,t}^Q$$

- DRP factor is constructed as *unexplained firm-specific return*: $R_{i,t}^u = R_{i,t}^Q - R_{i,t}^P$ where

$$R_t^Q = \frac{\mathrm{E}_t^Q\left[\exp(-\int_t^{t+h}(r_s + \lambda^Q(s))ds)\right]}{\mathrm{E}_{t-h}^Q\left[\exp(-\int_{t-h}^{t}(r_s + \lambda^Q(s))ds)\right]} \quad \text{and} \quad R_t^P = \frac{\mathrm{E}_t^P\left[\exp(-\int_t^{t+h}(r_s + \lambda^P(s))ds)\right]}{\mathrm{E}_{t-h}^P\left[\exp(-\int_{t-h}^{t}(r_s + \lambda^P(s))ds)\right]}$$

- The idea is that DRP measures approximately the change in risk-premium:

$$R_{i,t}^u \approx (\lambda_{i,t}^Q - \lambda_{i,t}^P) - (\lambda_{i,t-h}^Q - \lambda_{i,t-h}^P)h$$

Asset pricing tests

- Run panel regression: $$R^u_{i,t} = \alpha_i + \beta_{S,i} F^S + \delta_t + \epsilon^i_t$$
  - F^S includes known systematic factors such as: Mkt, HML, SMB, HML, DEF, TERM.
  - DRP factor is defined as $\boxed{\mathrm{F}^D_t = \delta_t + \frac{1}{N} \sum \alpha_i}$
- Estimate beta coefficients from time series regressions (separate for each i):
$$r_{i,t} - r_f = \alpha^i + \beta^i F^S(t) + \beta^i_D F^D(t) + \epsilon^i(t)$$
  for several test assets r_i:
  - equity portfolios (sorted on size and BM)
  - IG and HY corporate bond portfolios (sorted on ratings and maturity)
  - SP 500 Put options returns (sorted on Moneyness and maturity).
- Test if average returns line up with β coefficients via cross sectional regression:
$$\bar{r}_i - \bar{r}_f = \bar{\alpha} + \gamma^S \beta^i + \gamma^D \beta^i_D + \eta^i$$
- Results:
  - DRP factor is significant in all time-series regressions.
  - DRP factor helps explain cross-section of average excess returns on corporate bonds and put options, but not on equity returns (even after controlling for FF factors).
  - Significant and large α remaining.

Comments

- Is DRP a new factor to add to the list of HML, SMB, MOM...? Perhaps, but:
  - DRP is not the return on a zero-investment portfolio ($\neq$ HML, SMB...).
  - Therefore α are not 'true' excess returns that can be captured by trading strategy.
  - DRP is estimated using full-sample (forward looking).
- Why should assets with a high covariance with DRP, which measures the change in $(\lambda^Q - \lambda^P)$, have higher expected returns?
  - A conjecture:

$$\begin{aligned} \Delta(\lambda^Q - \lambda^P) &\approx \Delta\lambda^Q \\ &\approx \frac{1}{\text{LGD}} \Delta CDS \end{aligned}$$

    (since λ^P and LGD are relatively stable).
  - So to first order change in $\lambda^Q - \lambda^P$ should be highly correlated with CDS return.
  - Therefore DRP is component of CDS return that is orthogonal to classic FF factors.
  - $\Rightarrow$ Finding that DRP is priced means high credit-beta CDS have higher expected return ($\approx$ CAPM).
    (also consistent with apparent high correlation between β^D and rating).
- Could be tested:
  - Add beta with respect to equally weighted CDS portfolio return.
  - compute correlation between change in $\lambda^Q - \lambda^P$ and change in CDS (or CDS return).

What are these jump to default risk-premia?

- Why call $(\lambda^Q - \lambda^P)$ a measure of Jump risk-premium?
  - Consider risky zero-coupon bond price $P(t,T) = \mathbf{1}_{\{\tau > t\}} \exp\left\{-(r_f + \lambda^Q)(T-t)\right\}$,
  - The risky return is:

$$\frac{dP(t,T)}{P(t,T)} = (r_f + \lambda^Q)dt - d\mathbf{1}_{\{\tau \leq t\}}$$

  - Therefore the risk-premium (excess expected return) is:

$$\mathrm{E}[\frac{dP(t,T)}{P(t,T)}] - r_f = \lambda^Q dt - \lambda^P dt = \boxed{(\lambda^Q - \lambda^P)}\, dt$$

- What model generates these risk-premia?
  - In theory, we expect the excess return to be compensation for covariance with the market (or more generally the pricing kernel) M_t:

$$(\lambda^Q - \lambda^P)dt = -\mathrm{E}[\frac{dM_t}{M_t}\frac{dP(t,T)}{P(t,T)}]$$

  - This means $\lambda^Q \neq \lambda^P$ only if the market jumps at the same time as the bond defaults $(dM_t dP(t,T) \neq 0)$
  - ⇒ *Each* individual firm's default must have a market-wide impact!
  - Convenient mathematically, but no clear economic interpretation (Jarrow, Lando, Yu (2002) CD, Helwege, Goldstein (2003)).

Conclusion

- Nice paper that extends cross-sectional Fama-French asset pricing tests to consider information from liquid traded CDS market.
- Interesting investigation of the puzzling jump-to-default risk premium factor.
- One may wonder if covariance with that factor is not similar to beta with CDS portfolio? Could be tested.
- Theoretical model proposed is based on simple PESO-problem (i.e., common jump to default for all firms). Model predictions are not fully exploited.
- Would like to see more theory as to what asset pricing model is being tested, especially, what generates those jump to default risk-premia and the premium for covariation with DRP.
- Why not use CDS return as test assets directly (instead of corporate bond portfolio returns that are more noisy).