Discussion of "Credit Contagion from Counterparty Risk" by Philippe Jorion and Gayan Zhang

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Overview

- A firm's default can affect other firms' creditworthiness because:
  - it provides information about the health of a sector/industry.
  - it reduces the number of competitors.
  - it triggers a loss due to specific economic links (trade/credit relation).
- This paper focuses on the last point. It provides empirical evidence about the impact of bankruptcy on equity and CDS returns of the creditors of defaulting firms.
- Studies implications for portfolio credit risk and potential explanation for excess clustering of defaults.

Methodology

- Event study of equity returns and credit spreads of creditors around bankruptcy.
- Collect information on Chap 11 bankruptcies from Jan 1999 to Dec 2005:
  - Top 20 unsecured claim-holders (name, type of credit, amounts)
    Equity returns (CRSP)
    CDS spreads (MARKIT)
    Recovery rates (Fitch)
- Sample: 251 bcies with on average 3 creditors (in 146 industries).
- Construct equally weighted equity return on portfolio of creditors.
- Compute Cumulative abnormal return (CAR) in excess of industry and market for 3, 11 and 70 day windows.
- Compute change in equally weighted creditor portfolio credit spread in excess of spread on the index of similar credit quality (IG, HY...).
- Run cross-sectional regression for individual creditors CAR:

$$CAR = \alpha + \beta_1 EXP * (1 - REC) + \beta_2 CORR + \beta_3 VOL + \beta_4 LEV + \epsilon$$

  EXP = ratio of credit amount extended divided by market value of equity of creditor
  $CORR$ = 252-day correlation between equity returns (preceding event)
  LEV = leverage of creditor over four quarters preceding event.
- Study numerically implications of counterparty risk for portfolio default risk.

Results

- Bankruptcy announcement is not fully anticipated: firms experience -16.6% drop on average on the announcement day.
  (but only for the 66 firms that had not been delisted).
- 3-day CAR is very significant (-3.7% for industrials, -2.1% for financials).
- 3-day CDS change is very significant (+2.47bps for industrials, +0.13 for financials).
- In both cases, most of the action (statistical and economic significance) comes from days -1 and 0. But CAR on 11 and 70-day windows are also significant.
- In both cases, results are much stronger for industrial creditors than for financial.
- When studying the magnitude of the CAR in cross-sectional regressions (compare them to the size of the exposure), finds
  - for industrial, cannot reject that drop is limited to direct credit loss ($\beta_1 = -0.996$).
  - For financials point estimate larger $\beta_1 = -2.09$.
  - Correlation between stock returns seems to matter for financials ($\beta_2 = -7.7$).
- Find that Creditor firms (both financial and industrial) whose counterparty experienced a default are significantly more likely to be delisted or down-graded within one or two years than control group.

Are markets efficiently pricing counterparty risk?

- What's the null hypothesis?
  - If bankruptcy is anticipated **and** size of the credit exposure is known then expect no impact of the bcy event on creditor equity and CDS returns.
  - If bankruptcy is not anticipated and/or size of the exposure revealed at bankruptcy then expect a drop at time of bankruptcy of the size of the expected loss, and no subsequent abnormal returns.

  ⇒ Suggests looking at the non-delisted firms separately from the other one for which bankrupcty might have been expected. For delisted firms look at CDS. (possibly find stronger results for the 'surprise' sample).

  ⇒ Are certain types of exposures better known than others (bond vs. trade credit)?
- Interestingly, CAR for industrials appear highly statistically significant even on window [-5,65].

⇒ test trading strategy with implementation lag. Form portfolio on day 0 or day 1 and hold for 5,10,20 days → Abnormal profits? (perhaps not for financials).

- Puzzling that drop seems to be of same magnitude as exposure, i.e., not accounting for the size of the npv of economic relations (focus on trade-credit alone?).

⇒ Compare to results from Economic Links on equity returns (Cohen-Frazzini)

- Is it possible to have access to creditor information prior to bankruptcy announcement/release?

What are the implications of counterparty risk for pricing?

- Counterparty/contagion risk offers possible resolution of credit risk puzzle. Why?
- Suppose empirical defaults occur with constant intensity: $E_t^P[d\mathbf{1}_{\{\tau \geq t\}}] = \lambda^P dt$
- Further, assume under risk-neutral measure: $E_t^Q[d\mathbf{1}_{\{\tau \geq t\}}] = \lambda^Q dt$
- Then, risky cash-flows can be valued by discounting under the risk-neutral measure at the risk-adjusted rate $(r + \lambda^Q)$:

$$B(t, T) = E_t^Q[e^{-\int_t^T r(s)ds}\mathbf{1}_{\{\tau > T\}}] = e^{-(r+\lambda^Q)(T-t)}\mathbf{1}_{\{\tau > t\}}$$

- The risk-premium is given by:

$$\left(\frac{1}{dt}E\left[\frac{dB(t, T)}{B(t, T)}\right] - r\right) = \left(\lambda^Q - \lambda^P\right)$$

- How can we account for the difference $\lambda^Q(t) \neq \lambda^P(t)$?
- By definition risk-premium is

$$\left(\frac{1}{dt}\left[\frac{dB(t, T)}{B(t, T)}\right] - r\right) = -\frac{1}{dt}\mathrm{E}\left[\frac{dM(t)}{M(t)}\frac{dB(t)}{B(t)}\right]$$

$\Rightarrow$ If jump to default of firms arrive as a surprise **and** it has an impact on the market portfolio (state price density jumps), then default-event risk carries a special premium (that is independent of standard diffusion risk).

What are the implications of counterparty risk for pricing?

- Simple 'model' of equilibrium jump-to-default risk premium for $i = 1, \ldots, N$ firms:

$$\frac{dB_i(t)}{B_i(t)} = \mu_i dt - \Gamma_d d\mathbf{1}_{\{\tau_i \leq t\}} - \sum_j \Gamma_c d\mathbf{1}_{\{\tau_j \leq t\}}$$

- Suppose instantaneous CAPM holds and firms are symmetric ($M_t = \frac{1}{N}\sum_i^N B_i(t)$), then risk-premium is given by:

$$\frac{1}{dt}\left[\frac{dB_k(t)}{B_k(t)}\right] - r = \frac{\lambda}{N}\left(\Gamma_d + (N-1)\Gamma_c\right)^2.$$

  The sum of:
  - Jump-to-default credit risk premium $\frac{\lambda}{N}\left(\Gamma_d + (N-1)\Gamma_c\right)\Gamma_d$
  - Contagion risk premium $\frac{(N-1)\lambda}{N}\left(\Gamma_d + (N-1)\Gamma_c\right)\Gamma_c$

  $\Rightarrow$ If $N \to \infty$ jump-to-default risk priced (i.e., $\lambda^Q > \lambda^P$) only if contagion risk $\Gamma_c > 0$.
  $\Rightarrow$ As $N \to \infty$, need $\Gamma_C \sim \frac{1}{\sqrt{N}}$ for risk premia to be finite. ($\lambda^Q - \lambda^P$ cannot be big).
  $\Rightarrow$ Expect ($\Gamma_d \gg \Gamma_c$) but ($\Gamma_d \ll (N-1)\Gamma_c$). impact on credit premium can be significant.

- For contagion to matter for pricing, truly need a market wide impact of the event upon the credit event. Is the documented 'contagion' via trade-credit losses sufficient? (need a domino effect or information contagion).

Specific Comments

- For CDS could also compute CAR instead of changes in spreads. Further, easy to control for industry and market credit return. More interesting for comparison to equity approach.
- Since Bankruptcy filing is largely an anticipated event, might be interesting to find effect on counterparties when news hits the market (can be identified via large jump in CDS or in equity return).
- Current simulations assume each firm is linked with each other, which leads to domino effect and leads to large impact. What if there are separate clusters of firms within separate sectors?
- Would be interesting to combine direct contagion with industry effect. Not clear that the latter is not more important for portfolio credit risk.

Conclusion

- Interesting study. Clear evidence of counterparty risk.
- Important implications for VAR modeling (i.e., risk-measurement of credit portfolios/tranches).
- Would be interesting to have better sense if has implications for trading strategies/market efficiency.
- Not so clear it translates into pricing impact/contagion risk-premia (need to see effect on large diversified portfolio).