Discussion:
Debt with Endogenous Safety Covenants:
Default and Corporate Securities

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Objective

► Value corporate debt with an *endogenous* safety covenant

► What type of safety covenants are considered
  • Promise to repay principal if equity value falls below some threshold

► Why is this covenant endogenous?
  • In a typical structural model (e.g. Merton (1973) and Leland (1998)), equity value is endogenous, unlike asset value.
Motivation

▶ There is concern that issuing debt with safety covenants can *increase* the probability of bad events, such as default.

▶ Firm’s which have issued debt with endogenous safety covenants, such as Enron, have suffered a sharp *fall* in share price.

Questions:

▶ Inside a standard structural model, what impact do endogenous safety covenants have on the *share price* and *default probability* and why?
Model

- Exogenous asset value, $V$

- Debt value is $D$. Debt has face value $K$ and matures at time $T$

- Equity value is $E$
No safety covenants: Merton (1973)

- The debtholder receives her principal $K$ if $V_T > K$.
- If $V_T \leq K$, default occurs and the firm’s assets $V_T$ are transferred to the debtholders
- The debtholder owns a European-style option

$$D_t = E^Q_t [e^{-r(T-t)} \min(V_T, K)]$$

- The equityholders own the firm’s assets less the payment of $K$ to the bondholders, unless default occurs, i.e. $V_T \leq K$, in which case the value of equity is zero.
- The equityholder owns a European-style call option

$$E_t = E^Q_t [e^{-r(T-t)} \max(V_T - K)]$$
With a Safety Covenant

Safety covenant

1. Debtholder can get back principal $K$, if $E \leq F$, where $F$ is exogenous
2. Equityholder can choose to pay back principal $K$ to debtholder, if $E > K$

Time at which debtholder chooses to get back principal is some stopping time $\tau_d$

Time at which equityholder chooses to repay principal is some stopping time $\tau_e$

Debt value now has two components
1. When $E \leq F$, the debtholder must decide when to exercise the option, provided that the equityholder has not previously paid back the debtholder, i.e. $t < \min(\tau_e, T)$

$$E_t^Q \left[e^{-r(\tau_d-t)} \min(V_{\tau_d}, K)\right]$$

2. The debtholder receives $\min(V, K)$ at date $\tau_e$, when the equityholder repays her

$$E_t^Q \left[e^{-r(\tau_e-t)} \min(V_{\tau_e}, K)\right]$$

▶ Overall debt value is the optimal value (wrt $\tau$) of the sum of the two components:

$$E_t^Q \left[e^{-r(\tau_d-t)} \min(V_{\tau_d}, K)1_{E \leq F} 1_{\tau < \min(\tau_e, T)} + e^{-r(\tau_e-t)} \min(V_{\tau_e}, K)1_{\tau = \tau_e}\right]$$

▶ Debtholder owns an American option with payoff $\min(V, K)$. 
Similarly, equity value has two components

\[ E_t^Q \left[ e^{-r(\tau-t)} \max (V_\tau - K, 0) 1_{E_\tau \geq F} \right] \]

and

\[ E_t^Q \left[ e^{-r(\tau_d-t)} \max (V_{\tau_d} - K, 0) 1_{\tau_d < \tau \text{ or } (E_\tau \leq F \text{ and } \tau = \tau_d)} \right] \]
Debtholders’ Optimal Stopping Problem

• Just ask for prepayment of principal whenever $E \leq F$. 
Equityholders’ Optimal Stopping Problem

Hard: The equityholders can only decide to redeem the debt’s face value whenever $E > F$, but $E$ itself depends on the equityholder’s decision!
(Some of the) Main Results

- Protection for debtholders is at expense of equityholders and the covenant reduces equity value

- Default probability is increased by the safety covenant
Minor Comments

- Paper has many results. Decide which ones to focus on

- More intuition