Optimal Debt and Equity Values in the Presence of Chapter 11 and Chapter 7

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Question

• Does the bankruptcy option, or Chapter 11 (as opposed to liquidation only, or Chapter 7) create value?
  – Who are the beneficiaries?
  – How are rents allocated between debt and equity values with and without Chapter 11?
  – What is the value of avoiding liquidation?
  – Which code is optimal?

• Our results should be viewed as a shadow to other ways to sort out liquidity problems; i.e. strategic debt service
• We answer the questions in the context of the Contingent Claim Analysis of Merton (1974), Black and Cox (1976)
Motivation

• The literature has addressed traditional explanations of the bankruptcy role:
  – Resolution of information asymmetries
    – private workouts vs bankruptcy (Chen, 2003)
  – Resolution of the agency conflict
    – increasing riskiness after the debt issue (Leland, 1998)

• However bankruptcy and liquidation are independent:
  – A profitable firm with high leverage may remain viable as a going concern irrespective of bankruptcy
  – In the CCA literature the two events are treated as one and the same

• We are the first to provide quantitative characterization of this aspect
Overview of results

- Whether or not the bankruptcy code improves the welfare depends on who is in control of decision making at various stages.
- If equity holders decide when to take the firm to chapter 11 and when to liquidate, the resulting outcome is far from first-best.
- If equity-holders decide when to take the firm to chapter 11, but thereafter lenders decide when to liquidate, the outcome is a lot closer to the first-best.
- Probability of default is higher in our model than in traditional models of default. Equity dilution is lower.
- Conditional on being in chapter 11, probability of liquidation is lower in our model.
- Asset prices reflect these changes favorably.
Important features of the bankruptcy mechanism

- **The automatic stay**
  - Stops payments to unsecured creditors
  - Secured creditors can not take possession of collateral

- **The debtor-in-possession (DIP)**
  - Current management retains control
  - Exclusivity period to file reorganization plan
  - DIP financing allows senior borrowing

- **Reorganization**
  - Must be approved by all classes of creditors
  - The plan (exclusivity period) could be delayed by management
  - Bargaining powers favor debtors
Time Series of Events

- Liquid
- Equity Dilution
- Default

Paths:
- Path A
- Path B
- Path C

Time intervals:
- $\tau_t^{V_B}$
- $t$
- $\tau_t^{V_L}$
- $T$
- $\tau_t^d$
Sequence of Events

- **Liquid State**
  - $A_t = 0$
  - $\delta_t < c$

- **Equity Dilution**
  - $V_t < V^B$

- **Clearing bankruptcy**
  - (1-$\theta$)$A$ is forgiven
  - $S$ is used to pay $\theta A$

- **Default**
  - Cost: $\int_{\tau_i}^{t} \omega V_s ds$
  - $A$: $c(t - \tau_i^{V_B})$
  - $S$: $\int_{\tau_i}^{t} \delta ds$

- **Liquidation**
  - Cost: $\alpha(V+S)$
  - $V_t = V^L$

- **$V = PV(\delta)$**
Who makes the decision?

• This question is central since the existence of a bankruptcy code can lead to a conflict of interest between the lenders (debt-holders) and borrowers (equity-holders).

• We consider three scenarios in bankruptcy decision:
  – Maximize the firm value (first best)
  – Maximize equity value (US code)
  – Maximize debt value (UK code, US code?)

• Assume firm value maximization for the liquidation decision
Incorporated Features

• The automatic stay
  ✓ Stops payments to unsecured creditors
  – Secured creditors can not take possession of collateral

• The debtor-in-possession (DIP)
  – Current management retains control
  ✓ Exclusivity period to file reorganization plan
  ✓ DIP financing allows senior borrowing

• Reorganization
  – Must be approved by all classes of creditors
  ✓ The plan (exclusivity period) could be delayed by management
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Firm Value Maximization (First-Best)

Bankruptcy Boundary

Equity Value

Firm Value

Spread
Equity Value Maximization

Bankruptcy Boundary

Equity Value

Firm Value

Spread
Debt Value Maximization

Bankruptcy Boundary

Equity Value

Firm Value

Spread
Term Structure of Default Probabilities
(Equity Maximization)
Term Structure of Liquidation Probabilities
(Debt Maximization, $d=2$ years)
Transfer of Control Rights

\( \alpha = 50\% \)

\( \alpha = 90\% \)
Optimal Capital Structure (relative to the Leland model)

- Debt capacity increases
- Optimal debt level increases
- First-best results are intact
  - Probability of default is still higher
  - Probability of liquidation is negligibly lower
    - But, the coupon rate is higher
Summary

• We study the role of bankruptcy code using CCA approach
• We find:
  – Firm value maximization improves both debt and equity
  – Forgiving part of debt, \( \theta \), leads to the highest firm values
  – Debt maximization is similar to firm maximization (slightly worse than first best)
  – Equity maximization extracts all the rents in equity’s favor
    – Equity and Firm value maximizations lead to different outcomes (cf. Leland’ 94)
  – Ch.11 increases probability of default and decreases the probability of liquidation
  – Transfer of control to debt after the default leads to the first-best strategies