

A Theory of U.S. Bankruptcy Chapters

Contracting Externalities in Bankruptcy

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(Advice to PhD students:

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Pick coauthors that are better than you

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(Secret to Writing Good Papers:
...and blame *them* if anything goes wrong.)

Can the U.S. code have advantages?

or

Why does the Government not allow firms and creditors to contract to whatever default resolution system they want?

Clarification

This is *not* “why do firms reorganize?”

- We have good theories of reorganization [e.g., Shleifer-Vishny]
- If/when reorg is so good, why not let firms decide this for themselves? [Schwartz]
- We have no theories of the U.S. bankruptcy code (with no-opt-out Chapter choice).
 - We believe we are first.
 - More broadly, non-contractible no-opt-out is common. “Inalienable” rights.

Legal Institutions, Background, Reality

(Don't ask me finer legal details.)

Legal Institutions, Background, Reality



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Legal Institutions, Background, Reality



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Scenarios To Consider

- Firms could be allowed by law to contract a-priori with their creditors what to do upon default:
 - They could contract to liquidate.
 - They could contract to reorganize.
 - They could contract to leave themselves or creditors to choose whether to liquidate or reorganize.

This is the “commercial law” approach. Freedom of Contract.

- Bankrupt Firms can be forced by law to liquidate. (— Sweden)
- Bankrupt Firms could be forced by law to reorganize.
- Bankrupt Firms can be forced by law to have the choice whether to liquidate or reorganize (“menu”). — US

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Can US law be “optimal” in some sense?

(not necessarily socially, but for firms as a group.)

Broadest Answer

- Parties that can internalize *everything* a-priori are never better off with outside intervention.
 - Outside intervention can help (only) when there are non-resolvable externalities. [intuitively, not exact]
 - Specific Externality:
 - Simultaneous fire sales affect all liquidators.
 - Firms cannot internalize peer firms' behavior.
 - Left to their own devices, firms fall into an inferior eqbm and liquidate too much.
- ⇒ Despite a-priori endogenous debt choice, no-opt-out Ch11 option reduces in-equilibrium liquidations, and thus makes all firms better off.

Simplest Model of Bankruptcy

What are the simplest ingredients for a model of bankruptcy to address Chapter-related questions?

- Endogenous Debt Choice
- Atomistic Firm Behavior (uncoordinated RE)
- Liquidation (“fire sale”)
- Reorganization (will be costly in shortfall D-V)

+ Contract Choice: Endogenous or Exogenous

As conventional a bankruptcy model as we can think of.

Plan of Attack

- 1 Work out behavior under mandatory identical behavior for **all** firms:
 - Only Liquidation
 - Only Reorganization
 - Allowed to choose (non-repudiable “menu”)

(will take some time to cover.)
- 2 Consider the “meta-problem”: are firms better off if
 - free-to-contract ex-ante
 - being forced (to have choice menu ex-post)

Simplest Model of Bankruptcy

Two Dates:

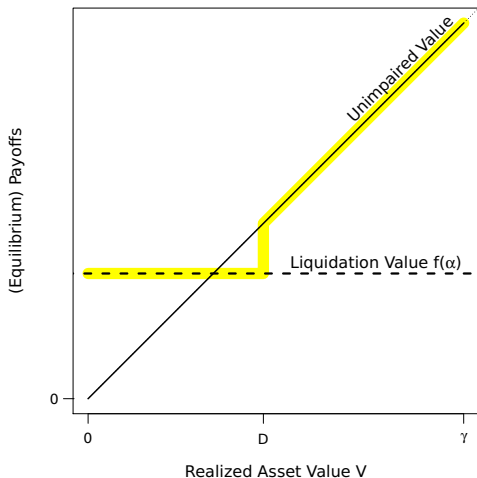
- Date 0: Many atomistic firms choose debt D .
Get Benefit from Debt ($\lambda = 10\%$)
Distress resolution system known (later choosable).
- Date 1:
 - Value V is determined. (random draw $U[0, \gamma = 1]$)
 - If $V > D$, firms repay debt unimpaired. World ends.
 - If $V < D$, distress.
 - If liquidation was mandated, liq.
 - If reorganization was mandated, reorg.
 - If reorg allowed, managers can decide.
(Note: optional rule does not prevent liquidation!)

Optimal debt choice will depend on system.

Liquidation-Only

Assumed Payoffs

- Liquidation: Independent of continuation value.
- Liq Val depends on other simultaneous fire sales.



Liquidation Mechanics

- Fire-sale:

$$L - \kappa \cdot \alpha = \$0.5 - \$0.2 \cdot \alpha$$

α is fraction of firms liquidating.

- No other firm liquidates: Get \$0.5.
- All other firms liquidate: Get \$0.3.

- Firms cannot individually influence α , but can anticipate it.
- Firms set own debt, which in aggregate determines α

⇒ α determines D. Many D determine α .

- (Law of Large Numbers: firms know this perfectly, a priori.)

Liquidation-Only Equilibrium

Conjecture that $\alpha = 0.5$.

Claim (and check) that $D = 0.5$ is optimal:

$$\begin{aligned} \max_D \int_0^D \underbrace{(\$0.5 - \$0.2 \cdot 0.5)}_{\$0.4} dV &+ \int_{V=D}^1 \underbrace{V dV}_{\text{not in distress}} + \underbrace{0.1 \cdot D}_{\text{debt benefit}} \\ &= (\$0.4 + \$0.75)/2 + 0.1 \cdot (D=\$0.5) = \$0.625. \end{aligned}$$

- Pick less D. Say \$0.4. Get $\$0.16 + \$0.42 + \$0.04 = \0.62 .
- Pick more D. Say \$0.6. Get $\$0.24 + \$0.32 + \$0.06 = \0.62 .

Liquidation Equilibrium

(Correctly worry only about symmetric equilibria)

Is $\alpha = 0.5$?

If every firm $D = 0.5$ and V is uniform from 0 to 1, then yes.

This is the only equilibrium. If α were > 0.5 (< 0.5), each firm would be better off choosing less (more) debt.

Reorganization

Reorganization Mechanics

- Reorg is costly. If $D > V$:

$$V - \phi \cdot (D - V) = V - 2 \cdot (D - V)$$

- If Debt = \$0.6: If $V = \$0.6$, firm gets $0.6 - 2 \cdot \$0.0 = \0.6 .
- If Debt = \$0.6: If $V = \$0.5$, firm gets $0.6 - 2 \cdot \$0.1 = \0.4 .

+ Managers like to continue (too often).

Reorganization-Only Scenario

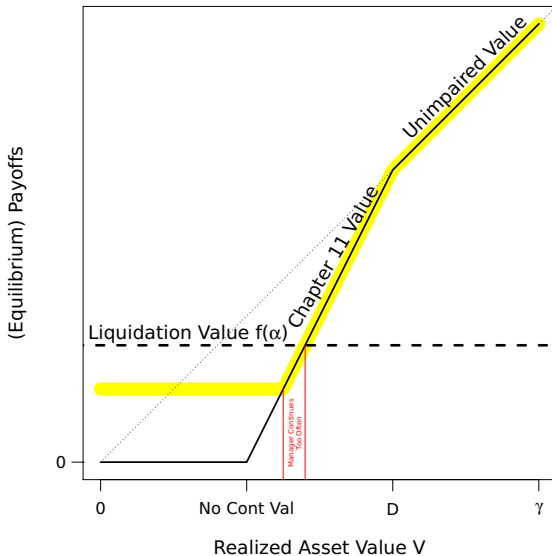
Uninteresting = skip:

- If managers want to liquidate, firm will always let them.
- Liquidation is better for owners than for managers.
- Instead, let's look at case where firms allow managers to choose whether to reorganize or liquidate

Every firm would get $\gamma/2 \cdot (1 + \lambda^2/\phi) = 1/2 \cdot (1 + 0.1^2/2) = 0.5025$ if reorg was forced. pretty bad.

With Optional Reorganization

With (Optional) Reorganization



With-Reorganization Equilibrium

Thought Experiment Now:

- All firms (are forced to) have a reorganization option in financial distress.
- No firm can opt out into the committed-liquidation procedure.
- However, managers can decide in distress to liquidate.

All Firms Allow With-Reorganization

- Conflicted Manager ($\beta = \$0.2$): Reorg when

$$\underbrace{V - 0.2 \cdot (D - V)}_{\text{Reorg Value}} + \underbrace{\beta}_{\text{Bias}} > \underbrace{\$0.5 - \$0.2 \cdot \alpha}_{\text{Liq Value}}$$

- (At this point, V and $\alpha = \alpha(D)$ are known.)

$$V_i \geq \frac{\bar{L} - \beta + \phi \cdot D + \kappa \cdot \alpha}{1 + \phi} \equiv \frac{\$0.5 - \$0.2 + 2 \cdot D + \$0.2 \cdot \alpha}{1 + 2} \equiv \bar{V}$$

depends on D (chosen by firm) and α (collective equilibrium).

- All firms with $V < \bar{V}$ choose liq. All $V > \bar{V}$ choose reorg.

With-Reorganization Equilibrium

Equilibrium:

1 $D^* \Leftrightarrow \alpha$

2 \bar{V}

Claim:

- $D^* = \$0.5611$. $> \$0.5$ than with only-liq. (More Distress)
- $\alpha^* = 4/9$. $< 50\%$ with only-liq. (Fewer Liq)
- $\bar{V} = \$4/9$.
- $V = \$0.6265$ $> \$0.625$ higher val than with only-liq.

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Confirming Optimal D

Assume $\alpha = 4/9$. Also $\bar{V} = \$4/9$.

Claim: $D^* = \$0.5611$.

$$\begin{aligned} \max_D V \equiv & \int_0^{\bar{V}=\$4/9} (\$0.5 - \$0.2 \cdot 4/9) dV && \leftarrow \text{Liquidation} \\ & + \int_{\$4/9}^D V - 2 \cdot (D - V) dV && \leftarrow \text{Reorganization} \\ & + \int_D^{\$1} V dV && \leftarrow \text{Not in Default} \\ & + D \cdot 0.1 && \leftarrow \text{Debt Benefit} \end{aligned}$$

With-Reorganization Equilibrium

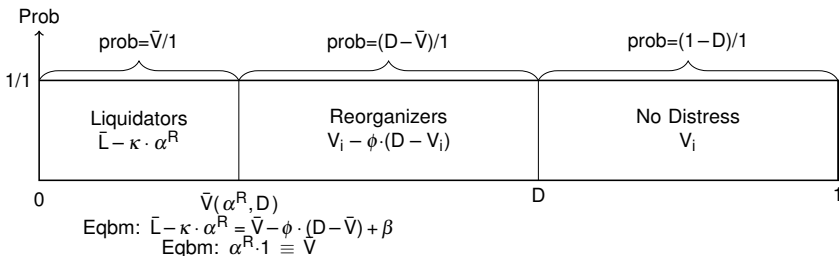
- add some algebra and shake. Given $\alpha = 4/9$ and $\bar{V} = \$4/9$,

$$D^* = \$0.5611,$$

(Coincidentally, $V(D^*) = \$0.6265$.)

- Plug D^* and α into \bar{V} to confirm that $\bar{V} = \$4/9$ given $\beta = \$0.2$

- All firms from 0 to $\$4/9$ liq, from $\$4/9$ to $\$0.5611$ reorg, and beyond =ok



- With $\gamma = 1$, a $\bar{V} = 4/9$ also means $\alpha = 4/9$.

Meta Problem

Prescribe No-Opt Out vs. Freedom-of-Contract?

Meta Problem: Choice of Procedure

Are there parameter values where

- 1 If all other firms liquidate, you want to liquidate, too.
(“Stability” Condition: Too much liquidation traps firms.)
- 2 If all other firms do with-reorg, you want to commit liq.
(“Instability” Condition: With-Reorg cannot hold firms.)
- 3 Firms are collectively better off if all firms commit to with-reorg and not to liq-only.
(“Chamber of Commerce” Condition)

([1] and [2]: we require no asymmetric information. however, signaling “race to the bottom” could also accomplish this.)

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⇒ Firms prefer no-opt-out Chapter 11 reorg as code.

(The proofs actually are over all pure and mixed equilibria. Only pure equilibria work.)

The Externality

- Ch11 possibility does not and cannot prevent liquidation.
- ...but its mandatory presence reduces in-equilibrium liquidations.
- ...and all firms benefit therefrom.

PS: and it's better than mandating reorganization to avoid all liquidation

note: for considering defection from equilibrium, if you consider opting out alone, you are still subject to the same fraction liquidating of peers that play other equilibrium. defecting to with-reorganization does not help you as much, relative to all with-reorganization.

Algebraic Versions

- 1 If all other firms liquidate, you want to liquidate, too.
(*“Stability” Condition: All-liquidation traps firms.*)

$$\left(\frac{\beta}{\gamma \cdot \lambda}\right)^2 < \left(\frac{1+\phi}{\phi}\right)$$

- 2 If all other firms reorganize, you still want to liquidate.
(*“Instability” Condition: Reorg cannot hold firms.*)

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Actual Proof: The all-liquidation equilibrium is the unique equilibrium. No mixed equilibria.

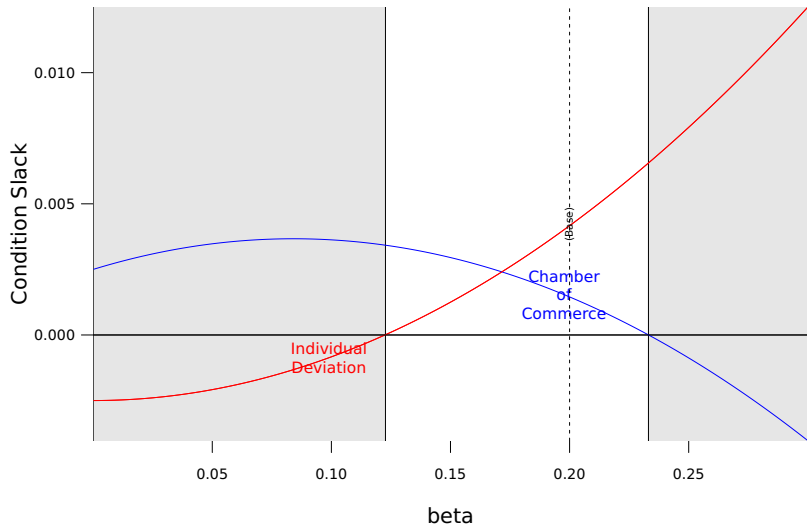
Algebraic Versions

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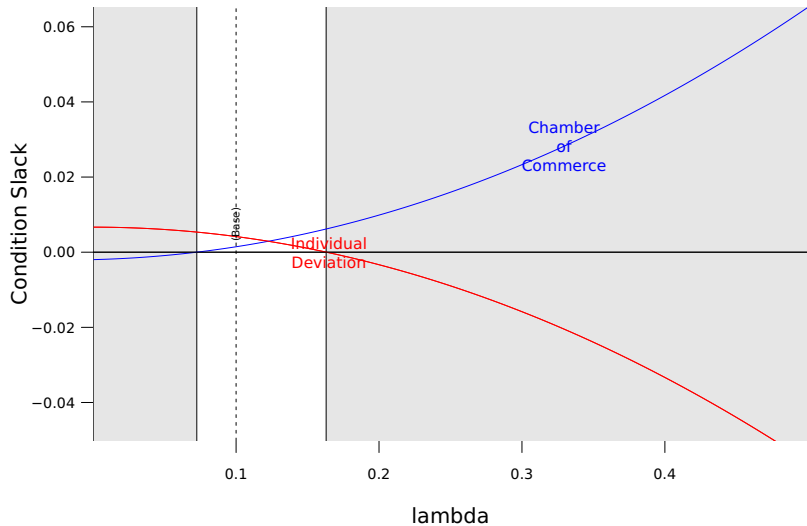
$$\begin{aligned} & \gamma^2 \cdot (\gamma + \kappa)^2 \cdot (1 + \phi)^2 \cdot \lambda^2 + 2 \cdot b \cdot \gamma \cdot \kappa \cdot \phi \cdot (1 + \phi) \cdot (\bar{L} + \gamma \cdot \lambda) \\ & - \beta^2 \cdot \phi \cdot [\kappa^2 \cdot \phi + \gamma^2 \cdot (1 + \phi) + 2 \cdot \gamma \cdot \kappa \cdot (1 + \phi)] > 0. \end{aligned}$$

A quadratic mess. Roughly, the condition is satisfied for intermediate values

Pretty Picture: Managerial Bias (Agency)



Pretty Picture: Debt Benefit (Capacity/Tax)



Similar Applications

- When are optional choices and defaults better/worse than mandatory no-opt-out menus?
- Preferences — should we allow preferences? Should we allow firms to contract around them?
- On efficiency grounds, when do we want rights to be non-alienable? Should we allow opt-out and forced ex-ante contracting from
 - regular-cycle elections?
 - CEO-for-life? President-for-Life?
 - Marriage?
 - Labor (Slavery)?
 - Court Resolution?

(Good other legal and ethical arguments, but not here.)

Welfare Analysis

- Model can explain why firms and creditors do not lobby strongly for “freedom-of-contract” here.
- But is Chapter 11 socially optimal?
 - Who knows?
 - Firms like debt, partly due to tax redistribution.
 - Reallocation of assets in fire-sales may be transfer, not destruction.
 - Reasonable to argue either way. Not important here.

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Conclusion

Model

- Atomistic choices aggregate into collective choices, which influence atomistic choices. It is an elegant way to model externalities.
- Presentation hid a lot of algebra. But this model is unusually pretty, and it has closed-form solutions!

Economics

- Liquidation externalities naturally create large (intermediate) regions where firms are better off if they cannot contract to opt out from later menu choice.
- Conditions suitable to broader questions and analyses.

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