Discussion

Capital Structure and Hedging Demand with Incomplete Markets

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This Paper

What is/should be the objective of a firm?

Central question in

- Corporate Finance
- General Equilibrium
- Macroeconomics
- Common answer: Value maximization
 - Complete markets/perfect information: good answer
 - Firm problem is well defined without uncertainty
 - Incomplete markets: whose "value" should the firm maximize?
- Usual approach: avoid the problem
 - No-outside equity
 - Segmented markets
- Another central question in Corporate Finance:

How do firms choose their capital structure?

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- 1. Theory of capital structure (and investment) based on the demand for corporate securities (coming from risk-sharing)
 - "Catering theory": Firms cater to its financiers
- 2. Operationalizes and expands the Makowski criterion to environments with incomplete markets and imperfect information

Roadmap of my discussion

- 1. Review of the environment
- 2. Review of the main results
- 3. Comments/remarks

Environment

• Aggregate risk ε

Household problem (I households)

$$\max_{c_{0},c_{1}^{i}(\varepsilon),\theta^{i},b^{i}}u\left(c_{0}^{i}\right)+\beta\mathbb{E}\left[u\left(c_{1}^{i}\right)\right]$$

subject to

$$\begin{split} c_0^i &= w_0^i + \theta_0^i V - q \theta^i - p b^i \\ c_1^i(\varepsilon) &= w_1^i(\varepsilon) + \theta^i d^e(\varepsilon) + b^i d^b(\varepsilon), \; \forall \varepsilon \\ \theta^i &\geq 0, \quad b^i \geq 0 \end{split}$$

Firm payoffs

$$d^{e}(k,B;\varepsilon) = \max \{e^{\varepsilon}f(k) - B, 0\}$$
$$d^{b}(k,B;\varepsilon) = \min \{1, e^{\varepsilon}f(k)/B\}$$

<u>Remark</u>: debt and equity as primitives
Richer set of securities?

<u>Remark</u>: no short sales (partially relaxed)

Environment

Firm problem

$$V = \max_{k,B} -k + q(k,B) + p(k,B)B$$

where $m^{i}(\varepsilon) = \frac{\beta u'(c_{1}^{i})}{u'(c_{0}^{i})}$ and
 $q(k,B) = \max_{i} \mathbb{E}\left[m^{i}d^{e}(k,B)\right]$
 $p(k,B) = \max_{i} \mathbb{E}\left[m^{i}d^{b}(k,B)\right]$

- The solution to this problem gives
 - 1. Supply of credit: $B\left(\left\{m^{i}\left(\varepsilon\right)\right\}\right)$
 - 2. Equilibrium investment $k\left(\left\{m^{i}\left(\varepsilon\right)\right\}\right)$
- Remark: c^i (equivalently, m^i) are taken as given
- Equilibrium notion: competitive equilibrium + "rational conjecture"

Objective of the firm

Dreze:

Equilibrium shareholders

$$q(k,B) = \sum_{i} \theta^{i} \mathbb{E}\left[m^{i} d^{e}(k,B)\right]$$

Grossman-Hart:

Ex-ante shareholders

$$q(k,B) = \sum_{i} \theta_{0}^{i} \mathbb{E}\left[m^{i} d^{e}(k,B)\right]$$

Makowski/BCG:

Equilibrium shareholders, incorporating the possibility of selling

$$q(k,B) = \max_{i} \mathbb{E}\left[m^{i}d^{e}(k,B)\right]$$

Main Results

►
$$I = 2, y = e^{\varepsilon}Ak^{a}, \varepsilon \sim N(\mu, \sigma^{2}), \theta_{0}^{i} = 1/2, u(c) = \frac{c^{1-\psi}}{1-\psi}$$

► $w_{1}^{i} = e^{-\chi_{i}\mu - \frac{1}{2}\chi_{i}^{2}\sigma^{2} + \chi_{i}\varepsilon}$

- ▶ $\chi_1 = 0$ and $\chi_2 > 0$ (risky endowment only type-2)
- Higher value of χ_i means
 - Higher variance and skewness of w_1^i
 - Higher covariance with risk factor
 - Expected value is constant
- Comment: why not decompose variance from covariance risk?

Main Results

• Comparative statics when χ_2 is higher

- 1. Hedging needs go up and the firms' incentives to cater to those needs by issuing more bonds (higher leverage and default probability)
- 2. Investment goes up (ambiguous)
- 3. Risk-free rate goes down
- Variance of aggregate risk: similar to χ_2
- Supply of risk-free debt: crowding out of debt
- Limited short-selling: similar to increasing supply of risky-debt, less need for hedging via firms

Main Results: Technology Specialization

Firms' problem is not convex (max {·} function)
Technology specialization

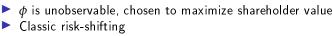
$$F(k,\phi;\varepsilon) = \phi e^{\varepsilon} A k^{\alpha} + (1-\phi) A_w k^{\alpha}, \quad \phi \in \{0,1\}$$

 When χ₂ is large enough, some firms choose the safe technology

Main Results: Agency

Special case

$$F(k,\phi;\varepsilon) = \phi e^{\varepsilon} A k^{\alpha} + (1-\phi) A_{w} k^{\alpha}, \quad \phi \in [0,1]$$



- General case
 - Existence
 - Constrained efficiency without agency problems
 - Constrained inefficiency with agency problems
 - Unanimity of shareholders (important property)

Final Comments

- 1. I really like the approach
 - Appealing properties
 - Scope be used in other contexts (e.g., dynamic models)
- 2. Note that the equilibrium features perfect segmentation
 - Maybe this justifies imposing segmentation as an assumption ex-ante
 - Does the Makowski/BCG approach always yield segmentation?
 - What if we had I = 3?
 - Comparing # of assets vs # of agents?
 - Theory of tranching
- 3. More generally, I would like to understand better the properties of the problem of the firm

Final Comments

- 4. I was hoping to see some analytical results
 - Maybe specializing the model a bit more
 - What if one set of agents is risk-neutral?
 - Different discount factors β^i ?
 - Choice of parameters for simulations could be justified better
- 5. Separation of funding and investment decisions
 - Fix k, consider only funding decisions
- 6. It'd be nice to compare the results to the Dreze and Grossman/Hart criteria in the applications
- 7. There is scope to explore the normative properties of the model with agency frictions
- Some advertisement
 - Davila/Walther, Prudential Policy with Distorted Beliefs
 - Heterogeneous beliefs instead of risk sharing as driver of leverage/investment choices