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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This Paper

- **This paper**
  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

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

- **Firm payoffs**

$$\begin{aligned} d^e(k, B; \varepsilon) &= \max\left\{e^\varepsilon f(k) - B, 0\right\} \\ d^b(k, B; \varepsilon) &= \min\left\{1, e^\varepsilon f(k)/B\right\} \end{aligned}$$

- Remark: debt and equity as primitives
  - Richer set of securities?
- Remark: 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: $B\left(\left\{m^i(\varepsilon)\right\}\right)$
  2. Equilibrium investment $k\left(\left\{m^i(\varepsilon)\right\}\right)$
- 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

- $I = 2$, $y = e^{\varepsilon} A k^{a}$, $\varepsilon \sim N\left(\mu, \sigma^2\right)$, $\theta_0^i = 1/2$, $u(c) = \frac{c^{1-\psi}}{1-\psi}$
- $w_1^i = e^{-\chi_i \mu - \frac{1}{2}\chi_i^2 \sigma^2 + \chi_i \varepsilon}$
- $\chi_1 = 0$ 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 ($\max\{\cdot\}$ 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 χ_2 is large enough, some firms choose the safe technology

Main Results: Agency

- Special case

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

  - ϕ is unobservable, chosen to maximize shareholder value
  - Classic risk-shifting
- 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