Overview:

- The Modigliani-Miller Theorems.
  - MM Proposition I.
  - MM Proposition II.
  - MM Dividend Policy Irrelevance.
- Using MM sensibly.
Modigliani-Miller Theorem(s):
Under some assumptions, corporate financial policy is irrelevant.

Corollaries:

- Financing decisions are irrelevant.
- Capital structure is irrelevant.
- Dividend policy is irrelevant.
- Cash management is irrelevant.
- Risk management policy is irrelevant.
- Cross shareholdings are irrelevant.
- Diversification is irrelevant.
- Etc.

MM is a paradigm shift, and the foundation of modern corporate finance.
MM-Proposition I (MM 1958):
A firm’s total market value is independent of its capital structure.

MM-Proposition II (MM 1958):
A firm’s cost of equity increases with its debt-equity ratio.

Dividend Irrelevance (MM 1961):
A firm’s total market value is independent of its dividend policy.

Investor Indifference (Stiglitz 1969):
Individual investors are indifferent to the firms’ financial policy.
Assumptions

- Frictionless markets: No transaction costs, etc.
- Competitive markets: Individuals and firms are price-takers.
- Individuals and firms can undertake the same financial transactions at the same prices (e.g., borrow at the same rate).
- All agents have the same information.
- No taxes.
- A firm’s cashflows do not depend on its financial policy (e.g., no cost of bankruptcy).

Remark:

- MM applies to all securities, not just debt and equity.
- It is simply a value additivity result.
- If A and B are cashflow streams, absence of arbitrage opportunity implies:
  \[ V(A + B) = V(A) + V(B) \].
- MM applies to all purely financial transactions: Their NPV is zero.
ARBITRAGE APPROACH

Idea of the proof ("by contradiction"):

- Consider two firms differing only in their capital structures.
- If they have different total market values, an arbitrage opportunity exists.
- That is, one can make a risk free profit by trading securities.
- Incompatible with equilibrium.

Remarks:

- MM’s proof requires two identical firms.
- Single-firm proof (Miller 1988).
- General Equilibrium approach (Stiglitz 1969).
- MM did not have a theory of risk.
- MM introduced the idea of risk-classes. For our purpose, firms in the same risk class will have identical cash flows.
- Note: Firm-level irrelevance does not imply indeterminacy in aggregate, e.g., firm-level irrelevance may hold only in equilibrium (as in Miller (1977)).
Model

Consider firm 1 and firm 2 in the same risk-class:

- At $t = 1, 2, \ldots$, both firms yield the same (random) return $X$.
- At $t = 0$, they have different capital structures:
  - Firm 1 has equity and a constant level of risk-free debt.
  - Firm 2 has no debt.

Notation:

- At $t = 0$,
  - Risk-free rate: $r$.
  - Market value of firm $i$’s debt: $D_i$.
  - Market value of firm $i$’s equity: $E_i$.
  - Total market value of firm $i$: $V_i = D_i + E_i$.

- Hence, at $t$:
  - Firm 1’s debtholders receive: $rD_1$.
  - Firm 1’s equityholders receive: $X - rD_1$.
  - Firm 2’s equityholders receive: $X$. 

Step 1: It cannot be that $V_2 > V_1$.

- Suppose $V_2 > V_1$.
- Consider an investor holding a fraction $\alpha$ of firm 2’s shares.
- At $t$, he would receive $\alpha X$.
- Instead, he could:
  - Sell the shares for $\alpha V_2$.
  - Buy a fraction $\frac{\alpha V_2}{V_1}$ of firm 1’s debt and equity as:
    
    $$
    \alpha V_2 = \left(\frac{\alpha V_2}{V_1}\right) D_1 + \left(\frac{\alpha V_2}{V_1}\right) E_1.
    $$

- At $t$, the investor would receive:
  
  $$
  \left(\frac{\alpha V_2}{V_1}\right) r D_1 + \left(\frac{\alpha V_2}{V_1}\right) (X - r D_1) = \left(\frac{\alpha V_2}{V_1}\right) X
  $$

  $$
  > \alpha X \quad \text{for all } X.
  $$

- $\Rightarrow$ An arbitrage opportunity exists.

- **Intuition:** Arbitrageurs can “undo firm 1’s leverage” by buying its debt and equity in proportions such that interest paid and received cancel out.
Step 2: It cannot be that $V_1 > V_2$.

- Suppose $V_1 > V_2$.
- Consider an investor holding a fraction $\alpha$ of firm 1’s shares.
- At $t$, he would receive $\alpha(X - rD_1)$.
- Instead, he could:
  - Sell the shares for $\alpha E_1$.
  - Borrow $\alpha D_1$.
  - Invest the total in a fraction $\alpha \frac{V_1}{V_2}$ of firm 2’s shares:

  \[
  \alpha E_1 + \alpha D_1 = \left( \alpha \frac{V_1}{V_2} \right) \cdot V_2.
  \]

- At $t$, the investor would get $\alpha \frac{V_1}{V_2} X$ and pay interests $r\alpha D_1$:

  \[
  \left( \alpha \frac{V_1}{V_2} \right) X - r\alpha D_1 = \alpha \left( \frac{V_1}{V_2} X - rD_1 \right)
  \]

  \[
  > \alpha (X - rD_1) \quad \text{for all } X.
  \]

- $\Rightarrow$ An arbitrage opportunity exists.

- **Intuition:** Arbitrageurs can “lever up” firm 2 by borrowing on individual accounts (homemade leverage).
COST OF CAPITAL

• MM was controversial as debt seemed cheaper than equity:
  – Interest rates on corporate debt $\approx 5\%$.
  – Equity earnings/price ratios (then the conventional measure of the cost of equity capital) $\approx 20\%$.

• Under such conditions, how could financing be irrelevant?

• MM’s Proposition II shows that there is no contradiction.

Proposition II: A firm’s cost of equity increases with its debt-equity ratio.

• Intuition: Raising debt makes existing equity more risky, hence more costly.
Proof:
The firm’s Weighted Average Cost of Capital (WACC) is:
\[
\text{WACC} = \frac{D}{D+E}r + \frac{E}{D+E}r_E = \frac{Exp[X]}{V},
\]
where:
- \(r\) is the cost of risk-free debt capital, i.e., its return.
- \(r_E\) is the cost of equity capital, i.e., its expected return.

This can be rewritten as
\[
r_E = (\text{WACC} - r) \frac{D}{E} + \text{WACC}.
\]

By Proposition 1, the WACC is independent of the D/E ratio.
\(\Rightarrow r_E\) is linear in \(D/E\).

Note:
- If \(\text{WACC} > r\) (i.e., \(r_E > r\)) then \(r_E\) increases with \(D/E\).
- In practice, \(r_E > r\) essentially for all firms.
- Therefore, the difference between the cost of debt and equity is compatible with the irrelevance proposition.
- MM did not have a theory of risk but their results are consistent with CAPM.
MM vs. Clientele Theories

Clientele Theory:

- Investors with heterogenous preferences and needs value the same cash flow streams differently.
- ⇒ Financial policy choices affect the match between securities and heterogenous preferences.
- ⇒ Financial policy can affect firm value (i.e., financial marketing).

Example: An all-equity firm might fail to exploit the potential demands for risky and safe securities. It may be worth more by separating riskier from safer cash flow streams (e.g., into debt and equity) so that investors can focus on their preferred security.

Intuition for MM:

- Modigliani and Miller (1958) show that this reasoning is flawed.
- Investors' preferences are over cashflows, not securities.
- They are not limited to the securities issued by firms.
- If investors can undertake the same transactions as firms, at the same prices, they will not pay a premium for the firms to undertake such transactions on their behalf.
- Put differently, if investors can freely reverse the firms’ financial decisions, these are immaterial.

Note: MM do not assume away heterogeneity. But, the match between preferences and cash flow streams need not be organized by the firms. There is no value to financial marketing.
MM DIVIDEND POLICY IRRELEVANCE

- Gordon model of stock valuation:

\[ V_0 = \sum_{t=1}^{\infty} \frac{E_0 [d_t]}{(1 + r_t)^t}, \]

where

\[ E_0 [d_t] \] is the expected dividend at date \( t \),

\( r_t \) increases with \( t \) due to greater risk.

Main idea:

- Dividends are safer than future payments.
  \( \Rightarrow \) Dividends increase firm value.

- MM show that this theory is flawed.
- The arbitrage proof relied on identical cashflows.
- But shareholders receive dividends, not cashflows.
- Do dividends have to be identical too?
- If yes, MM would be much less interesting.
Proposition: A firm’s value is independent of its dividend policy.

- Each “period”, the firm:
  - Invests and retains cash (Investment Policy).
  - Raises new capital (Financing Policy).
  - Pays some dividends (Payout Policy).

- Accounting identity: Taking Investment Policy as given, a change in Payout Policy has to be met by a change in Financing Policy.

- For instance:
  - A dividend increase can be financed with a new debt issue.
  - A dividend decrease can be met by a retirement of debt.

- Existing shareholders and new investors form a “closed system”.
  ⇒ The total value of their claims is unaffected (value conservation).

- New investors are competitive.
  ⇒ The value of their claims is unchanged.
  ⇒ The value of the current shareholders’ claims is unchanged.
USING MM SENSIBLY

- Financial decisions do matter at the firm level.
- So what do we make of the irrelevance result?
  - Avoid some fallacies: WACC fallacy, EPS fallacy,...
  - Organize your thoughts.

Main message:

- Value is created only by operating assets (i.e., on LHS of BS).
- If Financial Policy is unrelated to Investment Policy, then it is irrelevant: It merely divides a “pie” of fixed size.
- Serves as a benchmark: If we know what does not matter, we may be able to infer what really matters.

How can financial decisions affect the size of the pie?

- Investors cannot undertake the same financial transactions as firms due to taxes, transaction costs and short-sale restrictions, bankruptcy costs, information asymmetries, etc.

Yet, we are far from being done with MM.
Readings (starred articles are recommended):


Surveys, etc.


Related literature:


PROBLEMS

Problem 1 (MM, The Single-Firm Proof)

Consider a single firm at $t=0$ that has (possibly risky) debt with face value $K$ maturing at $t=1$. At $t=1$, the value of the firm’s assets takes a random value $X$ and the firm is liquidated.

a) Write the value of the firm’s debt and equity as a function of those of a risk-free bond and of a call and a put on the firm’s asset.

b) Derive MM Proposition I without resorting to a comparable firm.

c) Compare this proof to the “risk-class” proof. What are, in your view, its main merits and weaknesses?

Problem 2 (MM, The General Equilibrium Approach)

The aim of this problem is to show that a version of MM is valid in a static General Equilibrium model, and that all agents are indifferent to the firms’ capital structures (in a sense to be soon clarified).

Consider an economy with a set $I$ of firms and a set $J$ of individual investors. At $t=0$, firm $i \in I$ has risk-free debt with value $D_i$, equity with value $E_i$ and total value $V_i = D_i + E_i$. At $t=1$, it generates a random gross return $X_i$. At $t=0$, individual $j \in J$’s wealth $w^j$ is invested in $D^j$ risk-free corporate debt and a fraction $\alpha_i^j$ of firm $i$’s equity. The gross risk-free rate of return is denoted $r$.

Show that for any given equilibrium, there exists another one with any firm having any other debt-equity ratio but with the value of all firms and the yield on risk-free debt being unchanged. That is, for any equilibrium with $D_i$, $V_i$ and $r$ and for any $\hat{D}_i$, there exists an equilibrium with $\hat{D}_i$, $V_i$ and $r$. You may want to proceed as follows.

a) Write individual $j$’s wealth at $t=1$, $y^j$, as a function of $w^j$, $\alpha_i^j$, $V_i$ and $X_i$.

b) Consider an equilibrium with $D_i$, $V_i$ and $r$. Write the market clearing conditions for firm $i$’s equity and for risk-free debt.

c) Consider a change from $D_i$ to $\hat{D}_i$ and assume that, indeed, $V_i$ and $r$ are unchanged. Show that the $\alpha_i^j$ are unchanged.

d) Show that the equity markets and the debt market clear.

e) Conclude.

f) Does this result imply the irrelevance of the capital structure at the aggregate level, i.e., of the economy-wide debt-equity ratio?
g) Compare this General Equilibrium version of the MM Theorem with the (standard) arbitrage approach. What are the differences and similarities? What are, in your view, the relative strengths and weaknesses of the two approaches?

h) Consider the same model as before but now suppose that, at $t = 0$, the firms can also issue options to buy new equity at $t = 1$. Show that for any given equilibrium, there exists another one with any firm issuing any debt/equity and options/equity ratios but with the value of all firms and the yield on risk-free debt being unchanged.

**Problem 3 (MM Proposition II and CAPM)**

Assume that the conditions for MM Proposition I are satisfied and that CAPM holds. MM’s original Proposition II states that as a firm’s cost of equity capital increases linearly with its debt-equity ratio (with risk-free debt). What is the implicit assumption about the firm for this to hold? Explain.
Models Based on Incentive Problems

Overview:

- Moral hazard.
- Moral hazard and credit rationing.
- Jensen and Meckling (1976).
  - Effort problem.
  - Risk-shifting problem.
INCENTIVE ISSUES

• One MM assumption: Operating and financing decisions are independent.
• Relax that assumption, i.e., the pie’s size is affected by how it is split.
• The incentives of the party taking operating decisions depend on her claims.
• This party may not have incentives to maximize firm value.

Main idea:

(1) Conflicts of interests between the party making operating decisions (≡ insider) and outside investors.

(2) Outside financing involves costs due to Moral Hazard:

• Deviations from value maximization.
• Credit rationing: Some valuable projects cannot be financed.
• Costs incurred to prevent the above such as:
  – Monitoring.
  – Bonding.

Note: No standard model in Corporate Finance. Here, a few simple models to convey the main ideas. Hence, reading the papers is important.
Model

- An entrepreneur has a project.
- At $t = 0$: Financing.
  - Need $I > 0$.
  - Entrepreneur’s resources available: $W$.
- At $t = 1$: Moral hazard.
  - The entrepreneur is key to the project.
  - He can choose an “effort” level $e \in \{0, 1\}$.
  - Cost $c(0) = 0$ and $c(1) = c$.
- At $t = 2$: Cash flow.
  - $X \in \{X^L, X^H\}$ with $\Delta_X \equiv X^H - X^L > 0$,
  - and $\Pr[X = X^H] \equiv \theta + e \cdot \Delta_\theta$.

Assumption (*): Exerting the effort is efficient, i.e.,
$$\Delta_\theta \Delta_X > c.$$

Assumption: The project’s value is positive if $e = 1$, i.e.,
$$V_1 \equiv X^L + (\theta + \Delta_\theta) \Delta_X - I - c > 0.$$

Remarks:

- Throughout the course, universal risk-neutrality, no discounting, and competitive capital markets are assumed unless otherwise specified.
- We discuss entrepreneurial vs. managerial firms later.
- “Effort” is a metaphor! We will be more specific later.
Financial Contracts

• Financial claims are promises of payments at $t = 2$, contingent on $X$:
  
  $R^L$ if $X = X^L$ and $R^H = R^L + \Delta_R$ if $X = X^H$.

• Limited liability:
  
  $R^L \leq X^L$ and $R^H \leq X^H$

Examples:

• Debt with face value $K$:
  
  $R^L = \min\{X^L, K\}$ and $R^H = \min\{X^H, K\}$.

• Fraction $\beta$ of equity:
  
  $R^L = \beta X^L$ and $R^H = \beta X^H$.

• Call option on the firm’s equity with strike $K$:
  
  $R^L = \max\{X^L - K, 0\}$ and $R^H = \max\{X^H - K, 0\}$.

• Etc.

Remark:

• If $X^L = 0$, all contracts are linear (in cashflows):
  
  $R^L = 0$ and $R^H \geq 0$.

• There is no difference between debt, equity, etc.

• Useful modelling trick when one wants to concentrate on internal vs. external finance as opposed to the type of external finance.
First Best

If $W \geq I$, the entrepreneur should:

- Invest $I$ and exert $e = 1$.

What if $W < I$?

- The entrepreneur needs to raise at least $(I - W)$.
- He can sell a claim $(R^L, R^H)$.
- Competitive investors are willing to pay
  \[ R^L + (\theta + \Delta \theta) \Delta R. \]

Assumption (for now): $X^L = 0$.

- The entrepreneur raises at least $(I - W)$ with a claim such that:
  \[ R^H \geq R^H_{\min} \equiv \frac{I - W}{\theta + \Delta \theta}. \]
- Note: Possible since $R^H_{\min} \leq X^H$.
- For instance, he can sell a claim to the entire cash flow, i.e., $R^H = X^H$.
- Irrespective of $W$, the entrepreneur can always finance the project.
- MM applies: Firm value is independent of whether and how much the project if funded internally vs. externally.
Moral Hazard

• This result holds under the assumption that there is no incentive problem, i.e., effort is contractible or is not costly (i.e., \( c = 0 \)).

Assumption: Effort is costly (i.e., \( c > 0 \)) and non-contractible.

• This (conflict + non-contractibility) induces an incentive problem.

• For instance:
  – Suppose that the entrepreneur sells the entire cashflow at \( t = 0 \).
  – He has no incentives to incur a cost \( c(e) > 0 \) at \( t = 1 \).
  – Investors are willing to pay less for the firm’s claims.

• At \( t = 1 \), the entrepreneur chooses \( e = 1 \) iff:
  \[
  \Delta_\theta(X^H - R^H) \geq c \quad \text{or} \quad R^H \leq R^H_{\text{max}} \equiv X^H - c/\Delta_\theta.
  \]

• But financing the project (given \( e = 1 \)) requires:
  \[
  R^H \geq R^H_{\text{min}} \equiv (I - W)/(\theta + \Delta_\theta).
  \]

• Hence, the first best is obtained iff:
  \[
  R^H_{\text{min}} \leq R^H_{\text{max}}.
  \]

• Role of internal funds:
  – The condition is more likely to be satisfied when \( W \) is large.
  – Firms with more internal funds are less constrained in their investment strategy.

Note: If the entrepreneur were not key to the project, he could sell it to an investor who would run the project (i.e., choose \( e \)). More on this later.
What if $R_{\text{min}}^H > R_{\text{max}}^H$?

- The project’s value for $e = 0$ is:
  \[ V_0 \equiv X^L + \theta \Delta_x - I. \]

- **Credit rationing:**
  - Suppose $V_0 < 0$.
  - The entrepreneur cannot raise $(I - W)$, irrespective of $R^H$.

- **Deviation from value maximization:**
  - Suppose $V_0 > 0$.
  - The entrepreneur can raise $(I - W)$ but fails to use these funds optimally.

**Commitment problem:**

- The entrepreneur’s payoff is
  \[
  \text{Firm value} - \underbrace{\text{Net payment to competitive investor(s).}}_{= 0} = 0
  \]

  $\Rightarrow$ He is best-off maximizing firm value, which requires $e = 1$.

- However, once some claims are sold to investors, his incentives are determined only by the claims that he retains.

- Ultimately, the entrepreneur bears the costs of moral hazard.

**Costly commitment:**

- To commit to $e = 1$, the entrepreneur is willing to pay up to:
  \[ V_1 - \max\{V_0, 0\}. \]

- **Monitoring** by a blockholder, a bank, an auditor, etc...

- **Bonding**: Contractual commitment not to engage in certain actions (even if potentially valuable): Loan ear-marking, etc.
CAPITAL STRUCTURE
Jensen and Meckling (1976)

Main idea:

(1) Conflicts of interests:
   - Between inside and outside equityholders.
   - Between equityholders and debtholders.

(2) Specific costs:
   - Outside equity \( \Rightarrow \) Low “effort.”
   - Debt \( \Rightarrow \) Risk-shifting (a.k.a. asset substitution).

(3) Optimal capital structure minimizes these agency costs.
Model

Same as before except:

- \( X^L > 0 \), to be able to discuss financing choices.
- \( I > X^L \), for simplicity.
- \( W = 0 \), for simplicity.

**First-Best: Modigliani-Miller**

- Financing choices are irrelevant in the absence of Moral Hazard (i.e., if \( c = 0 \) or \( e \) is contractible).
- Say the entrepreneur chooses to raise exactly:
  \[
  I = R^L + (\theta + \Delta \theta) \Delta R.
  \]
- Debt with face value \( K \):
  \[
  R^L = X^L, \quad \Delta R = \frac{I - X^L}{\theta + \Delta \theta}, \quad K = R^H = R^L + \Delta R = X^L + \frac{I - X^L}{\theta + \Delta \theta}.
  \]
- Equity: Sell a fraction \( \beta \) of existing shares, i.e.,
  \[
  R^L = \beta X^L, \quad R^H = \beta X^H, \quad \text{with} \quad \beta = \frac{I}{X^L + (\theta + \Delta \theta) \Delta X}.
  \]
- **Intuition**: Competitive investors. \( \Rightarrow \) Irrespective of financing, the entrepreneur receives the investment’s entire value.
Optimality of Debt

- At $t = 1$, the entrepreneur chooses $e = 1$ iff:

$$\Delta_\theta (\Delta_X - \Delta_R) \geq c \quad \text{or} \quad \Delta_R \leq \Delta_R^{\text{max}} \equiv \Delta_X - c/\Delta_\theta.$$

- Debt is the contract for which this constraint is least severe, i.e., binding for a smallest set of parameters. Indeed, it solves:

$$\min_{(R^L, R^H)} \Delta_R$$

$$R^L \leq X^L \quad R^H \leq X^H$$

$$I \leq R^L + (\theta + \Delta_\theta) \Delta_R$$

- Debt is an optimal response to the effort problem: Projects that can be funded (e.g., with equity) can also be debt financed but the reverse is not true.

- **Intuition**: The optimal (debt) contract maximizes the fraction of the return from effort that accrues to the entrepreneur. Hence, it maximizes his incentive to exert effort.

Remarks:

- Jensen and Meckling (1976) show that debt dominates equity. We have shown that it also dominates all other contracts.

- In a more general model where effort affects the distribution of cashflows $\theta(X \mid e)$ over a continuum, Innes (1990) shows that debt is optimal under two conditions:

  - Monotone Hazard Rate Property: $\frac{\partial}{\partial X} \left( \frac{\partial \theta(X \mid e)}{\theta(X \mid e)} \right) > 0$.

  - Monotonic repayment schedule: $R(X)$ non-decreasing.
Cost of Debt: “Risk-Shifting”

• Same model except for Moral hazard at \( t = 1 \).

• Two mutually exclusive projects generating \( X \in \{0, \hat{X}, 2\hat{X}\} \) at \( t = 2 \).

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<tr>
<td>Project A</td>
<td>( \theta_1 )</td>
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<tr>
<td>Project B</td>
<td>( \theta_1 + \Delta_1 )</td>
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with \( 0 < \Delta_1 < \Delta_2 \) and \( \theta_1 + \Delta_1 + \theta_2 + \Delta_2 < 1 \).

• Assume that Project A’s value is positive, i.e.,

\[
(1 + \theta_1 - \theta_2)\hat{X} - I > 0.
\]

• Note: This problem does not satisfy the MHR property.

First Best

• Project B’s value is

\[
(1 + \theta_1 + \Delta_1 - \theta_2 - \Delta_2)\hat{X} - I.
\]

• This is less than Value(Project A), the difference being:

\[
(\Delta_2 - \Delta_1)\hat{X} > 0.
\]

• \( \Rightarrow \) \( I \) should be used for Project A.
Debt Finance?

• Suppose that $I$ is raised in debt with face value $K$.
• Assume (for simplicity) that $K > \hat{X}$, i.e.,
  \[(1 - \theta_2)\hat{X} < I.\]
• The entrepreneur gets a positive payoff only when $X = 2\hat{X}$.
• With Project A, he gets:
  \[\theta_1(2\hat{X} - K)\]
• With Project B, he gets:
  \[(\theta_1 + \Delta_1)(2\hat{X} - K).\]
\[\Rightarrow\text{Once } I \text{ has been raised, the entrepreneur picks Project B.}\]

Equity Finance?

• Suppose $I$ has been raised in equity.
• Once $I$ raised and invested, the entrepreneur gets a fixed share of cash flows.
\[\Rightarrow\text{He maximizes expected cash flows.}\]
\[\Rightarrow\text{He undertakes Project A.}\]
• Equity is optimal since it induces no distortion in investment.
Intuition

• The difference between Project A and Project B has two parts.
• An increase in $\theta_1$ and $\theta_2$ by $\Delta_1$ which preserves the mean:
\[ \Delta_12\hat{X} - 2\Delta_1\hat{X} + \Delta_1 \cdot 0 = 0 \]
but increases the variance.
• An increase in $\theta_2$ by $(\Delta_2 - \Delta_1)$ which decreases the mean:
\[ -(\Delta_2 - \Delta_1)\hat{X} + (\Delta_2 - \Delta_1) \cdot 0 < 0. \]

Debt:

• Risky debt’s payoff is concave in cash flows.
  ⇒ Levered equity’s payoff is convex in cash flows.
  ⇒ Equity holders have an incentive to take excessive risk.
• Value of call option increases with volatility. ⇒ Risk-Shifting problem.

Equity:

• The entrepreneur and the investors have the same claims. ⇒ No conflict.
• Linear claims. ⇒ No risk-shifting.
• Note: Equity dominates debt but also all other contracts. This holds in more general models (see Green 1984).
Risk-Shifting Model’s Implications

- More debt when there is less risk-shifting potential: e.g.,
  - Regulated public utilities with less managerial discretion (Bradley, Jarrell and Kim 1984).
  - Firms in mature industries with few growth opportunities (Barclay, Smith and Watts 1992).

- Risk shifting incentives are higher in financial distress because limited liability kicks in (Gambling for Resurrection).

- For instance, managers may delay filing for bankruptcy to keep equity’s option value alive.

- Or they may file for Chapter 11 rather than Chapter 7.

Mitigating asset substitution:

- **Covenants** to debt contract, e.g., interest coverage requirements or prohibition of investments into new, unrelated lines of business (Smith and Warner 1979).

- **Convertible Debt** alleviates existing shareholders’ risk-taking incentives by allowing debtholders to share in the upside, making shareholders’ payoff partly concave (Green 1984).
Readings (starred articles are recommended):


Surveys, etc.


Related Literature:


PROBLEMS

Problem 1 (Monitored Finance)

An entrepreneur with wealth $W$ has a project requiring an investment $I > W$ at $t = 0$ and generating a random cashflow $X \in \{0, X^H\}$ at $t = 1$. To undertake the project, he has to raise funds from competitive investors. The entrepreneur can exert an effort $e \in \{0, 1\}$ such that $\Pr[X = X^H] = \theta + e\Delta\theta$ and the entrepreneur derives private benefits $(1 - e)B$. In particular, $B$ cannot be shared with investors. Moreover, $e = 1$ is efficient and the project’s value is positive if $e = 1$ but negative if $e = 0$.

a) Show that when effort is not contractible and with limited liability for the entrepreneur, external financing is feasible only if $W$ exceeds some threshold. How does the threshold vary with the different parameters? Explain.

b) Suppose now that at a (non-contractible) cost $c$, a financial intermediary can monitor the entrepreneur, thereby reducing potential private benefits from $B$ to $b$. Assume that $b + c \leq \Delta\theta X^H$. Show that some firms that cannot be financed directly can get an intermediated loan if $b + c < B$. That is, investors are willing to fund the intermediary which in turn enters a financial contract with the entrepreneur. (Note: Monitoring being assumed to be non-contractible, the intermediary’s incentive to monitor need to be considered). Explain. Which firms will use intermediated finance?

Problem 2 (Effort Model)

An entrepreneur has a project requiring an investment $I = 50$ at $t = 0$ and generating a cash flow $X \in \{30, 120\}$ at $t = 1$. If and after the project is funded, the entrepreneur chooses to incur a cost $c(e) = 45e^2$ to exert a level $e \in [0, 1]$ such that $\Pr[X = 120] = e$. The firm has no assets in place. Everybody is risk neutral and there is no discounting.

a) If the entrepreneur can self-finance, what level of effort will he choose? Is it worthwhile investing in the project?

b) Assume now that the entrepreneur is cash constrained and that the project is financed with debt. Is it possible to finance the project with risk-free debt? For a given face value $K$, what is the equilibrium level of effort? What level of debt should the entrepreneur choose? How does the firm’s value compare with the one in a)? Interpret your answer.
c) If the entrepreneur finances the project by selling a fraction \( \alpha \) of equity, what is the effort level? Show that the project cannot be equity-financed. Interpret your answer.

d) Is it possible to find a contract \( \{R^L, R^H\} \) for which the firm’s value is higher than the one obtained in b)? Interpret your answer.
Overview:

- Lamont (1997).

Note:

- Here, we focus on allocation of finance to firms, i.e., functioning of external capital markets.
- As important for corporate investment if not more, is the capital allocation within firms, i.e., functioning of internal capital markets.
Main idea:

- Use dividend policy as a proxy for financial constraint.
- Investment-cashflow sensitivity is greater for low- than for high-dividend paying firms (controlling for investment opportunities).

- 422 large manufacturing publicly traded firms over 1970-84.

Note: Less likely to be financially constrained. So if find something here, likely to be present with other firms.

- Firms classified according to their earnings retention practices.
- If the cost disadvantage of external finance is small, the retention practice should reveal little about investment.
- Firms that retain and invest most of their income may have no low cost sources of external finance. Their investment should be driven by fluctuations in cash flows.
- Exclude firms that did not grow (real sales) over the period.
- Divide firms into three classes:
  - Class 1: Payout ratio below 10% for 10 years or more.
  - Class 2: Payout ratio in 10 – 20% range for 10 years or more.
  - Class 3: All other firms.
Class 1 vs. Class 3 firms (from summary statistics):

- Smaller (although still large firms).
- Grow faster (sales and capital stock).
- Invest more.
- Invest a larger fraction of cash flows (almost all).
- Have more volatile investment and cash flows.
- Have greater aggregate investment-cashflow correlation.

Table 2. Summary Statistics: Sample of Manufacturing Firms, 1970–84

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Category of firm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Class 1*</td>
</tr>
<tr>
<td>Number of firms</td>
<td>49</td>
</tr>
<tr>
<td>Average retention ratio</td>
<td>0.94</td>
</tr>
<tr>
<td>Percent of years with</td>
<td></td>
</tr>
<tr>
<td>positive dividends</td>
<td>33</td>
</tr>
<tr>
<td>Average real sales growth (percent per year)</td>
<td>13.7</td>
</tr>
<tr>
<td>Average investment-capital ratio</td>
<td>0.26</td>
</tr>
<tr>
<td>Average cash flow–capital ratio</td>
<td>0.30</td>
</tr>
<tr>
<td>Average correlations of</td>
<td></td>
</tr>
<tr>
<td>cash flow with investment</td>
<td></td>
</tr>
<tr>
<td>(deviations from trend)*</td>
<td>0.92</td>
</tr>
<tr>
<td>Average of firm standard</td>
<td></td>
</tr>
<tr>
<td>deviations of investment-capital ratios</td>
<td>0.17</td>
</tr>
<tr>
<td>Average of firm standard</td>
<td></td>
</tr>
<tr>
<td>deviations of cash flow–capital ratios</td>
<td>0.20</td>
</tr>
<tr>
<td>Capital stock (millions of 1982 dollars)</td>
<td></td>
</tr>
<tr>
<td>Average capital stock, 1970</td>
<td>100.6</td>
</tr>
<tr>
<td>Median capital stock, 1970</td>
<td>27.1</td>
</tr>
<tr>
<td>Average capital stock, 1984</td>
<td>320.0</td>
</tr>
<tr>
<td>Median capital stock, 1984</td>
<td>94.9</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations based on samples selected from the Value Line data base. See Appendix B.

a. Firms with dividend-income ratios of less than 0.1 for at least 10 years.

b. Firms with dividend-income ratios greater than 0.1 but less than 0.2 for at least 10 years.

c. Firms with dividend-income ratios greater than 0.2.

d. Estimated from time series constructed by aggregating the sample data within each category.
Class 1 vs. Class 3 firms (from summary statistics):

- Use equity issues more frequently and for a larger fraction of total financing (although still small relative to cash flow).
- Have higher debt ratios and lower interest coverage.

Consistent with pecking order story where Class 1 vs. Class 3 firms:

- Can rely less on internal funding of investment.
- Raise more external finance $\Rightarrow$ Lower leverage ratios.
- Cannot afford high dividends,

**Note:** Cashflow and $\Delta$Debt are positively correlated (even if use Tobin's to control for investment opportunities). So no offsetting.
In each time period, for each class run:

\[ \text{INV} = \alpha + \beta \text{CF} + \gamma Q + \text{Firm and year fixed effects} \]

Coefficient on Cash flow:

- Large for all classes (Not surprising, e.g., mismeasured \( Q \)).
- For Class 1 firms, greater for shorter/earlier period.
- **Larger for Class 1 firms** + **Substantially higher** \( \bar{R}^2 \).
- Difference greater for shorter period: Eventually, Class 1 firms pay dividends. Possibly: Decreasing asymmetric information.

**Note:** Similar conclusions for alternative estimation methods and specifications and models of investment other than \( Q \)-theory.
Comments

Dividend policy is the classification criterion:

- But why do firms pay dividends?
- How discretionary are they?
- Moreover, one would prefer a less endogenous variable.
- Subsequent studies use other criteria.

How do we control for investment opportunities?

- No obvious precise measure.
- Average $Q = \frac{\text{Market value of firm}}{\text{Replacement cost of assets}}$.
  - Correct for taxes, etc.?
  - Simpler methods estimate investment better.
- Tobin’s $Q$ may not be right:
  - Average vs. marginal.
  - Significant measurement errors of asset value (computed from accounting numbers).
  - Do we trust stock prices’ informational content?
  - Theory relies on strong assumptions.
Do mismeasured investment opportunities bias $\beta$?

- Cashflow is highly correlated with investment opportunities.
- More generally, liquidity is likely correlated with the profitability of investment: Firms that did well in the (recent) past are more likely to do well in the (near) future.
- Mismeasurement of investment opportunities biases $\beta$.
- Not too surprising that $\beta > 0$ even with best effort to control for investment opportunities.

What about differences in $\beta$ across classes?

- This more sophisticated approach is now widely used.
- The hope is that differences in $\beta$ are not as biased.
- The difference is unbiased estimate of the true difference if there is no systematic difference in measurement error across classes.
- But always subject to that question.

- Here, measurement error for investment opportunities is likely more severe for Class 1 firms which tend to be smaller.
- Moreover, endogeneity of dividends does not help: Class 1 firms may be retaining earnings because they have better investment opportunities that are not observable by the market.
Does the theory really predict that sensitivity decreases with wealth?

- See Kaplan and Zingales (1997).
- Begin with model:
  \[ \max F(I) - C(E, k) - I \]
  where \( I = W + E \).

- First Order Condition:
  \[ \frac{dI}{dW} = \frac{C_{11}}{(C_{11} - F_{11})} \]

- For sensitivity to be decreasing in wealth:
  \[ \frac{d^2I}{dW^2} = \frac{F_{111}C_{11}^2 - C_{111}F_{11}^2}{(C_{11} - F_{111})^3} \]

- Not obvious that this expression should be negative.
Hoshi, Kashyap, and Scharfstein (1991)

Main idea:

- Compare Japanese firms within and outside industrial groups.
- Group membership as proxy for financial constraints.
- Investment-liquidity sensitivity is greater for group firms.
- Suggestive of the role of banks.

- Sample: 337 Japanese manufacturing firms listed over 1965-86.
- Group membership has been very stable over several decades.

Firm classification:

- Members of six largest industrial groups (121).
- Independent firms (24).
- Other firms (192):
  - Group connected but no close financial ties (25).
  - Quasi-independent firms (152).
  - Subsidiaries of group firms (15).
Group Members are Likely Less Financially Constrained

- Main financial link is between firms and the large banks at the center of the group.

- Concentration of claims. ⇒ Less free riding among creditors.
  - Non-affiliated firms tend to spread their borrowing.
  - Group members borrow mostly from group banks.
  - Greater incentives to monitor and/or to refinance.

- Less debt-equity conflicts (especially near distress) ⇒ More debt capacity.
  - Group banks hold up to 10% equity (less now).
  - Life insurance companies also own large stakes.

- Direct monitoring:
  - Former bank employees hold key managerial positions in group firms.
Compared to group firms, independent firms:

- Investment similar level and more volatile.
- Liquidity and production are higher and more volatile.
- Slightly higher Tobin $Q$.
- Lower debt ratios.

---

**TABLE I**

**SUMMARY STATISTICS COMPARING GROUP AND INDEPENDENT FIRMS**

<table>
<thead>
<tr>
<th></th>
<th>Group firms</th>
<th>Indep. firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of firms</td>
<td>121</td>
<td>24</td>
</tr>
<tr>
<td>Median $I/K$</td>
<td>0.130</td>
<td>0.148</td>
</tr>
<tr>
<td>Mean standard deviation $I/K$</td>
<td>0.110</td>
<td>0.138</td>
</tr>
<tr>
<td>Median cash flow/$K$</td>
<td>0.240</td>
<td>0.291</td>
</tr>
<tr>
<td>Mean standard deviation cash flow/$K$</td>
<td>0.106</td>
<td>0.120</td>
</tr>
<tr>
<td>Median production/$K$</td>
<td>7.23</td>
<td>7.79</td>
</tr>
<tr>
<td>Mean standard deviation production/$K$</td>
<td>1.15</td>
<td>1.48</td>
</tr>
<tr>
<td>Median Tobin’s average $q$</td>
<td>1.04</td>
<td>1.23</td>
</tr>
<tr>
<td>Median debt/equity</td>
<td>0.97</td>
<td>0.66</td>
</tr>
<tr>
<td>Median $K$ (millions of 1982 yen)</td>
<td>13,037</td>
<td>13,388</td>
</tr>
<tr>
<td>Median sales growth</td>
<td>0.069</td>
<td>0.081</td>
</tr>
<tr>
<td>Median short-term securities/$K$</td>
<td>0.145</td>
<td>0.116</td>
</tr>
</tbody>
</table>

*Medians are calculated for all firms over all years. Standard deviations are calculated on a firm-by-firm basis and then averaged. Investment, $I$ and capital $K$ are for depreciable assets; other variables are defined in subsection IV.2 of the text.
For each class, run regression of investment on:

- Cash flow.
- Liquid assets:
  - No precise data on cash balances.
  - Rely on firms’ holding of short-term securities.
- Lagged production = Sales + ∆Inventories.
  - Empirical “accelerator effect”.
  - Not well understood.
  - Included because production is correlated with liquidity.
- Firm and year fixed effects.
Main result:

- Coefficients on Cash flow and Liquid assets are larger for independent firms.

- In fact, cashflow coefficient is small and insignificant for group firms.

Note: Since don’t understand the role of production, run the same regression without lagged production. Find similar result.
Although imprecise, the results go in the same direction.

Quasi-independent firms could belong to minor groups.

**TABLE III**  
*Investment Regression Equations for Firms with Mixed Status*

<table>
<thead>
<tr>
<th></th>
<th>President’s Council/not group firms</th>
<th>Quasi-indep. firms</th>
<th>Subsidiary firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash flow</td>
<td>0.406</td>
<td>0.245</td>
<td>-0.082</td>
</tr>
<tr>
<td></td>
<td>(0.162)</td>
<td>(0.042)</td>
<td>(0.049)</td>
</tr>
<tr>
<td>Short-term securities</td>
<td>0.110</td>
<td>0.082</td>
<td>0.105</td>
</tr>
<tr>
<td></td>
<td>(0.072)</td>
<td>(0.033)</td>
<td>(0.0131)</td>
</tr>
<tr>
<td>Tobin’s average q</td>
<td>-0.002</td>
<td>-0.000</td>
<td>0.019</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.004)</td>
<td>(0.008)</td>
</tr>
<tr>
<td>Production</td>
<td>0.032</td>
<td>0.012</td>
<td>0.022</td>
</tr>
<tr>
<td></td>
<td>(0.008)</td>
<td>(0.004)</td>
<td>(0.007)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.408</td>
<td>0.227</td>
<td>0.582</td>
</tr>
<tr>
<td>Number of firms</td>
<td>25</td>
<td>152</td>
<td>15</td>
</tr>
</tbody>
</table>

*The dependent variable is investment in depreciable assets divided by the capital stock at the beginning of the period. Production and the liquidity measures are normalized by the capital stock. The regressions include yearly dummies and firm dummies and cover the fiscal years 1977–1982. Standard errors are reported below the coefficient estimates.*
Competing Explanations

Why might the bias not be the same across classes?

Industry Effects?

• Possible explanation: Compared to group firms, independent firms are in high(er) growth industries where liquidity is a better proxy for investment opportunities.

• Group and independent firms do not really differ along industries. Regressions confirm the results.

Measurement Error?

• Possible explanation: Cash flow is less precisely measured for group firm than for of independent firms.
  – Transactions with other group firms not at market prices?
  – Reallocate funds within the group?

• Group firms are publicly traded.

• Lower level of coordination than required for the argument.

• Group firm cash flows are not much less volatile.

Endogeneity of Group Membership?

• Possible explanation: Maybe firms with better investment opportunities do not join groups.

• However, group affiliations are very stable.

• Moreover, no evidence that independent firms have performed better over the sample period.
Over- or Under-investment?

- Free cash flow theory (Jensen 1986): Assume that managers
  - will invest internal funds even in negative NPV projects,
  - but cannot get external funds for negative NPV projects.

- Firms with bad investment opportunities will exhibit investment cashflow sensitivity.

- If banks mitigate this problem, the sensitivity will be less for group firms with bad investment opportunities.

- Implication: Other things equal, \( \Delta \beta \) should be larger for firms with worse investment prospects.

<table>
<thead>
<tr>
<th>TABLE V</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INVESTMENT REGRESSION EQUATIONS IN WHICH LIQUIDITY EFFECTS VARY WITH TOBIN’S q</strong></td>
</tr>
<tr>
<td>Nongroup</td>
</tr>
<tr>
<td>firms</td>
</tr>
<tr>
<td>firms</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Cash flow</td>
</tr>
<tr>
<td>(0.058)</td>
</tr>
<tr>
<td>Cash flow* High Q dummy</td>
</tr>
<tr>
<td>(0.072)</td>
</tr>
<tr>
<td>Short-term securities</td>
</tr>
<tr>
<td>(0.042)</td>
</tr>
<tr>
<td>Short-term securities* high Q dummy</td>
</tr>
<tr>
<td>(0.058)</td>
</tr>
<tr>
<td>Tobin’s average q</td>
</tr>
<tr>
<td>(0.003)</td>
</tr>
<tr>
<td>Production</td>
</tr>
<tr>
<td>(0.004)</td>
</tr>
<tr>
<td>( R^2 )</td>
</tr>
<tr>
<td>Number of firms</td>
</tr>
</tbody>
</table>

*The dependent variable is investment in depreciable assets divided by the capital stock at the beginning of the period. Production and the liquidity measures are normalized by the capital stock. The regressions include yearly dummies and firm dummies and cover the fiscal years 1977–1982. Standard errors are reported below the coefficient estimates.

- Difference in investment is most severe for high not low \( Q \) firms.
Role of banks for corporate investment:

- Indirect evidence from greater stock price reaction to announcement of bank loan vs. bond issue (James 1987).
- Questions the wisdom of previous US banking laws, i.e., Glass-Steagall act.
Main idea:

- To separate cashflow and investment profitability:
  - Multi-segment firms: oil + non-oil;
  - Exogenous shock to cashflow to oil segments;
  - Examine effect on non-oil segments' investment.

- Non-oil segment of multi-segment firms cut investment.

- Use 1986 oil shock as exogenous instrument for cash:
  - Exogenous, large, unanticipated variation: Firms revised their investment plans.
  - 50% decline in oil prices: $26.6 in 12/85 to $12.67 in 04/86.
  - Uncorrelated (at least not positively) with investment profitability.

- Two biases against finding a relationship:
  - Large firms (recall FHP).
  - Survivorship bias: Constrained firms may have sold non-oil segments.
• Consider non-oil segments of firms with oil-segments:
  
  – Look at time-series correlation of profit and investment with real oil prices.
  – Use own judgement.

• Investment:
  
  – Raw.
  – Normalized by median same industry stand-alones.

![Real Crude Oil Prices 1977-1991](image)

**Figure 1. Real crude oil prices 1992 dollars per barrel.**
<table>
<thead>
<tr>
<th>Company</th>
<th>Ex ante</th>
<th>Ex post</th>
<th>Firm Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoco Corp</td>
<td>81</td>
<td>15</td>
<td>−4</td>
</tr>
<tr>
<td>Atlantic Richfield Co</td>
<td>74</td>
<td>47</td>
<td>4</td>
</tr>
<tr>
<td>Burlington Northern</td>
<td>28</td>
<td>28</td>
<td>−17</td>
</tr>
<tr>
<td>Canadian Pacific</td>
<td>28</td>
<td>7</td>
<td>−2</td>
</tr>
<tr>
<td>Chevron Corp</td>
<td>101</td>
<td>94</td>
<td>−2</td>
</tr>
<tr>
<td>Dekalb Energy Co</td>
<td>77</td>
<td>28</td>
<td>−12</td>
</tr>
<tr>
<td>Du Pont</td>
<td>49</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>Fina Inc</td>
<td>71</td>
<td>8</td>
<td>−1</td>
</tr>
<tr>
<td>Grace (W.R.) &amp; Co</td>
<td>28</td>
<td>10</td>
<td>−12</td>
</tr>
<tr>
<td>Homestake Mining</td>
<td>32</td>
<td>19</td>
<td>0</td>
</tr>
<tr>
<td>Imperial Oil Ltd</td>
<td>49</td>
<td>9</td>
<td>−4</td>
</tr>
<tr>
<td>Kerr-McGee Corp</td>
<td>57</td>
<td>16</td>
<td>−13</td>
</tr>
<tr>
<td>Litton Industries Inc</td>
<td>34</td>
<td>29</td>
<td>−5</td>
</tr>
<tr>
<td>Mobil Corp</td>
<td>94</td>
<td>83</td>
<td>1</td>
</tr>
<tr>
<td>Nova Corp of Alberta</td>
<td>41</td>
<td>29</td>
<td>0</td>
</tr>
<tr>
<td>Occidental Petroleum</td>
<td>88</td>
<td>31</td>
<td>−4</td>
</tr>
<tr>
<td>Phillips Petroleum Co</td>
<td>80</td>
<td>21</td>
<td>−1</td>
</tr>
<tr>
<td>Placer Dome Inc</td>
<td>43</td>
<td>27</td>
<td>9</td>
</tr>
<tr>
<td>Royal Dutch/Shell Grp</td>
<td>82</td>
<td>19</td>
<td>0</td>
</tr>
<tr>
<td>Schlumberger Ltd</td>
<td>94</td>
<td>65</td>
<td>−39</td>
</tr>
<tr>
<td>Southdown Inc</td>
<td>49</td>
<td>19</td>
<td>−12</td>
</tr>
<tr>
<td>Tenneco Inc</td>
<td>57</td>
<td>10</td>
<td>−4</td>
</tr>
<tr>
<td>Union Pacific Corp</td>
<td>41</td>
<td>48</td>
<td>−12</td>
</tr>
<tr>
<td>Unocal Corp</td>
<td>70</td>
<td>10</td>
<td>−1</td>
</tr>
<tr>
<td>USX Corp-Consolidated</td>
<td>78</td>
<td>52</td>
<td>−12</td>
</tr>
<tr>
<td>Zapata Corp</td>
<td>103</td>
<td>68</td>
<td>−62</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>63</strong></td>
<td><strong>31</strong></td>
<td><strong>−8</strong></td>
</tr>
</tbody>
</table>
### Segment Data for Oil-dependent Firms

$\Delta I/S$ is the change in the segment investment to sales ratio between 1985 and 1986. $\Delta CF/S$ is the change in the segment cash flow to sales ratio between 1985 and 1986. Cash flow equals pretax operating profit plus depreciation. Expressed as percentage points. SIC is Standard Industrial Classification.

<table>
<thead>
<tr>
<th>Company</th>
<th>Segment</th>
<th>$\Delta I/S$</th>
<th>$\Delta CF/S$</th>
<th>1985 Size (Mil $)</th>
<th>SIC Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Amoco Corp</td>
<td>Chemicals</td>
<td>3.46</td>
<td>5.88</td>
<td>2905</td>
<td>2860</td>
</tr>
<tr>
<td>2 Atlantic Richfield</td>
<td>Spec &amp; Int. chemicals</td>
<td>2.38</td>
<td>1.97</td>
<td>2155</td>
<td>2869</td>
</tr>
<tr>
<td>3 Burlington Northern</td>
<td>Forest products</td>
<td>-1.60</td>
<td>1.55</td>
<td>258</td>
<td>2411</td>
</tr>
<tr>
<td>4 Burlington Northern</td>
<td>Railroad</td>
<td>-6.63</td>
<td>-4.27</td>
<td>4098</td>
<td>4011</td>
</tr>
<tr>
<td>5 Canadian Pacific Ltd</td>
<td>Forest products</td>
<td>1.66</td>
<td>1.61</td>
<td>1546</td>
<td>2621</td>
</tr>
<tr>
<td>6 Canadian Pacific Ltd</td>
<td>Railroad</td>
<td>-3.40</td>
<td>-1.38</td>
<td>2408</td>
<td>4011</td>
</tr>
<tr>
<td>7 Chevron Corp</td>
<td>Chemicals</td>
<td>-1.30</td>
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<tr>
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<td>0.13</td>
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<td>3820</td>
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<td>31 Southdown Inc</td>
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<td>36 Union Pacific Corp</td>
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<td>-8.72</td>
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<td>Marine protein</td>
<td>-10.29</td>
<td>16.45</td>
<td>93</td>
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Average: $\Delta I/S = -1.46$, $\Delta CF/S = 2.43$, Size = 2109
Table V

Change in I/S, 1985–1986

Dependent variable: \( \Delta I/S \), where I is segment capital expenditure and S is segment sales. Expressed as percentage points. Median: The Z-statistic is the Wilcoxon signed-rank test, which tests the hypothesis that the observations are iid and symmetrically distributed around zero. Number positive: the 2-sided \( p \)-value is the probability of observing at most this number of positive or negative values, under the null hypothesis that the observations are independent and \( \text{prob}[\text{positive}] = 0.5 \). Industry-adjustment: For each observation of \( \Delta I/S \), I subtract the median value of \( \Delta I/S \) from a control group of COMPSTAT segments that were in the same industry, but were owned by companies that did not have an oil extraction segment.

<table>
<thead>
<tr>
<th></th>
<th>Raw</th>
<th>Industry-Adjusted</th>
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</thead>
<tbody>
<tr>
<td>No. of Observations</td>
<td>40</td>
<td>39</td>
</tr>
<tr>
<td>Mean</td>
<td>-1.46</td>
<td>-1.41</td>
</tr>
<tr>
<td>( t )-statistic</td>
<td>(2.34)</td>
<td>(2.06)</td>
</tr>
<tr>
<td>( p )-value</td>
<td>(0.02)</td>
<td>(0.05)</td>
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<tr>
<td>Median</td>
<td>-0.90</td>
<td>-0.80</td>
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<tr>
<td>Z-statistic</td>
<td>(2.51)</td>
<td>(2.18)</td>
</tr>
<tr>
<td>( p )-value</td>
<td>(0.01)</td>
<td>(0.03)</td>
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<tr>
<td>Number positive</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>( p )-value</td>
<td>(0.04)</td>
<td>(0.02)</td>
</tr>
</tbody>
</table>
• Also examine reasons for the result:
  – Evidence of overinvesting before the shock.
  – Little evidence of underinvesting after the shock.

• Raises interesting questions:
  – How does internal capital allocation works?
  – See lecture on conglomerates and capital allocation.

• Trade-off:
  – Sample size.
  – Well identified natural experiment.
  – Should replicate this type of study for other events and industries.

• Classification based in part on author’s judgement. Would prefer a less subjective method (e.g., input/output matrix?).

• Ozbas (1999): Decline in investments was part of a downward trend that began in the early 1980s. Questions Lamont’s conclusions.
Kaplan and Zingales (1997)

- Some low dividend paying firms in FHP actually had financial slack.
  - Examine each firm's annual report and 10-K.
  - FHP’s basic results are reversed for this small sample.
  - Claim ICF sensitivities do not have to be monotone in financial slack.

- Surprising - contradicts a large body of evidence that supports FHP’s results.

- Objections:
  - Small sample size.
  - Subjective judgement used to classify firms.
  - Most importantly, serious selection bias: Firms which KZ classify as Not Financially Constrainted are most likely to have very conservative management that closely match investment and cash flow.
Kaplan and Zingales Groups

• NFC - Not Financially Constrained if:
  – Cash dividend initiated or increased.
  – Repurchased stock.
  – CEOs’ report claims the company has ample liquidity.

• LNFC - Likely Not Financially Constrained if:
  – Unused lines of credit.
  – Cash reserves.

• PFC - Probably Financially Constrained if:
  – Unsure.
  – Contradictory evidence.

• LFC - Likely Financially Constrained if:
  – Postpone equity or convertible offering.
  – Claim in need of equity.
  – Cut dividend.

• FC - Financially Constrained
  – Violation of debt covenant.
  – Cutout of credit source.
  – Renegotiating debt.
Readings (starred articles are recommended):


James (1987)

Jensen (1986)


PROBLEMS
Problem 1 (from MIT Final 1999)
Fazzari, Hubbard, and Petersen (1988) and others document that year-to-year changes in firms’ capital expenditures are highly correlated with changes in their cash flows (earnings plus depreciation). Give a possible interpretation of this finding (taking it at face value). What are possible objections to this interpretation? What other interpretation can you think of? What type of empirical strategy could provide evidence making one interpretation more convincing? Give two or three examples of such experiments (assuming your are not constrained by data, time, etc.). If you know of empirical studies that have followed such a route, summarize their general idea and main findings.

Problem 2 (Cash flow constraint) (from MIT Finance Generals 2000)
Think about whether firms behave as if they are financially constrained, so that their investment is constrained by the extent of cash available.

a) Give some suggestive summary statistics that cash at hand constrains investment. No need for regressions, only some simple means.

b) What is the “standard” regression that argues for cash flow constraining investment (e.g., Fazzari-Hubbard-Petersen)? What are some studies using this general methodology?

i) What are the fundamental limitations in demonstrating a cash flow constraint on investment? And to what extent does this methodology overcome these limitations?

ii) What other criticisms have been made of this methodology?

iii) Describe any “cleaner” evidence we have and the problems with this evidence.

c) Suppose you had all the data and any sort of variation in the world that you wanted. Describe a way to test for cash flow constraints on investment.

d) Consider the following argument: “Many large firms in the US have superb debt ratings and easy access to credit. So these firms should not show any constraint of cash flow on investment.” Do you find this argument compelling?
Overview:

- Direct effects.
- Strategic effects.
  - Debt makes you tough: e.g., Limited Liability Effect.
  - Debt makes you weak: e.g., Predation.
Introduction

“Standard” Corporate Finance:

- Considers a firm’s cash flows as affected by stakeholders in the firm (insiders, outside investors, managers...).
- Ignores interaction between different firms.
- Yet, it is likely to impact on cash flows.

“Standard” Industrial Organization:

- Focuses on interactions between firms.
- Takes each firm as a black box.
- Ignores aspects “internal” to firms, in particular the relation between the firm and (potential) financiers and its influence on strategies.
DIRECT EFFECTS
OF CAPITAL STRUCTURE

Main idea:

- Capital structure can affect firms’ investment.

- Affects product market competition.

- **Debt makes you “tough”** (à la Jensen 1986).
  - Debt has a disciplinary effect.
    ⇒ The firm keeps costs down.
    ⇒ More aggressive in the product market (i.e., debt makes you “lean and mean”).

- **Debt makes you “weak”** (à la Myers 1977).
  - Debt overhang
    ⇒ Distorted investment policy.
    ⇒ e.g., lower investment in cost reduction.
    ⇒ Less aggressive on the product market.
STRATEGIC EFFECTS
OF CAPITAL STRUCTURE

Main idea:
Capital Structure affects firms’ strategic interactions in the product market.

Debt makes you tough:

- Debt induces over-investment (à la Jensen and Meckling 1976).
- Debt serves as a commitment to over-invest.

Debt makes you weak:

- Leveraged firms find it harder to raise external funds.
- Induces under-investment (à la Myers 1977).
- This can be exploited by competitors.
LIMITED LIABILITY EFFECT

Brander and Lewis (1986).

Main idea:

(1) Debt induces risk-shifting by shareholders (limited liability effect).

(2) In Cournot competition under uncertainty, risk increases with the quantity produced.

(3) Debt is a commitment to be aggressive in Cournot.

Model

• Firms 1 and 2 compete à la Cournot: $q_1$ and $q_2$.

• Zero marginal cost of production.

• Price $= a - bQ$ where $a \in \{a^L, a^H\}$ with $\theta \equiv \Pr [a = a^H]$.
All-Equity Firms
(standard Cournot model)

- Denote:
  \[ \hat{a} \equiv E[a] = \theta \cdot a^H + (1 - \theta) \cdot a^L. \]

- Firm \( i \)'s shareholders/management maximize:
  \[ E[X_i] = q_i \cdot [\hat{a} - bq_i - bq_j]. \]

- Reaction functions:
  \[ q_i^* = \frac{\hat{a} - bq_j}{2b}. \]

- Equilibrium quantities:
  \[ q_1^* = q_2^* = \frac{\hat{a}}{3b}, \quad Q^* = \frac{2\hat{a}}{3b}. \]

- Expected profits:
  \[ \Pi_1^* = \Pi_2^* = \frac{\hat{a}^2}{9b}. \]

Remark:

- The quantity \( q_i^* \) is ex-ante optimal.

- Ex-post over-production if \( a = a^L \).

- Ex-post under-production if \( a = a^H \).
Effect of Leverage

Assume now:

- Firm 1 has debt of $K$ high enough so that $K > X_1^L$.
- Firm 2 is all equity financed.

- Under Limited Liability, firm 1’s shareholders maximize:
  \[ E \left[ (X_1 - K)^+ \right] = \theta \cdot \left[ q_1 \cdot (a^H - bq_1 - bq_2) - K \right] + (1 - \theta) \cdot 0. \]
  That is, firm 1’s shareholders ignore the bad state and maximize:
  \[ q_1 \cdot (a^H - bq_1 - bq_2). \]
- Hence, firm 1’s reaction function is:
  \[ q_1 = \frac{a^H - bq_2}{2b}. \]
- Firm 2’s reaction function remains:
  \[ q_2 = \frac{\hat{a} - bq_1}{2b}. \]
- Equilibrium quantities:
  \[
  q_1 = \frac{\hat{a}}{3b} + 2 \frac{(1 - \theta) \Delta_a}{3b},
  q_2 = \frac{\hat{a}}{3b} - \frac{(1 - \theta) \Delta_a}{3b},
  Q = q_1 + q_2 = \frac{2\hat{a}}{3b} + \frac{(1 - \theta) \Delta_a}{3b}.
  \]
Compared to the standard Cournot outcome:

- Levered firm produces more,
- Unlevered firm produces less,
- Total industry output is greater,
- Price is lower.

**Intuition:**

- An increase by Firm 1 from Cournot quantity leads to:
  - A higher $X^H_1$: less under-production,
  - A lower $X^L_1$: more over-production,
  - A higher variance and lower mean.

- Limited liability $\Rightarrow$ Risk-shifting by shareholders at the expense of debtholders (as in Jensen-Meckling 1976).

- Firm 2 accommodates Firm 1’s more aggressive strategy.
Will Firm 1 Issue Debt?

- Equilibrium expected profit (remember that debtholders break even)

\[
E[X_1] = q_1 \cdot (\hat{a} - bQ)
= \left( \frac{\hat{a}}{3b} + 2 \frac{(1 - \theta)\Delta a}{3b} \right) \times \left( \hat{a} - b \cdot \left( \frac{2\hat{a}}{3b} + \frac{(1 - \theta)\Delta a}{3b} \right) \right)
= \frac{1}{9b} \cdot (\hat{a} + 2(1 - \theta)\Delta a) \times (\hat{a} - (1 - \theta)\Delta a).
\]

- To be compared with \(\frac{\hat{a}^2}{9b}\)

- Firm 1 is better off with debt if and only if

\[
\hat{a} - 2(1 - \theta)\Delta a > 0
\]

\[
3(1 - \theta)a^L > (2 - 3\theta)a^H
\]

- Satisfied for
  - \(\theta\) large enough.
  - \(a^L\) large enough.
  - \(a^H\) small enough.

- Indeed, this is when the expected loss w.r.t. standard Cournot (low state) is lowest.
Industry Equilibrium

Remark:

- Debt can constitute an entry barrier.
- Indeed, Firm 2’s profit are lower than in standard Cournot.

Assume now both firms in the market:

- Firm 1 and 2 choose their capital structure.
- Both may want to lever up.

\[ \Rightarrow \text{Both over-produce w.r.t. Cournot.} \]
\[ \Rightarrow \text{Both are worse off w.r.t. Cournot.} \]
\[ \Rightarrow \text{They would be better-off committing not to lever up.} \]
Comments

More general:

- Commitment to over-invest could be used against other parties (e.g., employees, government, etc.)
- Sometimes might prefer committing to under-invest (e.g., Perotti and Spier 1993).

Robustness?

- Does debt really make you tough?
- Robustness to other competition games? Not much.
- Debt might commit you to be soft, i.e., help collusion (Glazer 1994).

Commitment?

- Role of debt: Commit shareholders (ex-ante) to an ex-post inefficient reaction function.
- Renegotiation? “Secret recontracting”?

What kind of firm?

- Same problems as usual. Why is management aligned with shareholders?
- Management may try to avoid default ⇒ Excessively conservative.

General approach?

- Nice idea but: Do we really believe that firms choose their capital structure strategically as a commitment to influence their competitors?
PREDATION

“Old theories”

• Cash rich firms drive cash poor firms out of business by competing aggressively in the short run.

• Costly predatory strategies (e.g., predatory pricing) are compensated by increased profits following the prey’s exit.

Critique

• Why would investors terminate valuable firms? (renegotiation).
  ⇒ Why do rivals follow costly predatory strategies?

More recent theories

• Based on information asymmetry.

• Predator tries to convince rivals (or their investors) that the continuation value is negative.

• Examples:
  – Predator convinces investors that he (his rival) has low (high) costs.
  – Predator builds a reputation for being aggressive.
Agency-Based Theory

Resurrect the old idea of financially driven predation.

Main idea

(1) Outside finance involves agency problems ⇒ A firm’s investment capacity increases with cashflow.

(3) Predation reduces short-run cashflows to reduce their rival’s investment capacity.

Model

Main idea:

• The entrepreneur makes the repayments because of the threat of termination, i.e., exclusion from further credit.

Assumption (key): Non-verifiable cash flows.

• This generates investment-cashflow correlation in a rational model because investors will not want to lend in the last period.

Assumption (simplifying): The investor has full bargaining power initially.
Optimal Contract Absent Predation

Contract:

- Repay $R^L = 0$ and be refinanced with probability $\beta^L$.
- Repay $R^H$ and be refinanced with probability $\beta^H \equiv \beta^L + \Delta \beta$.
- The entrepreneur gets $\theta X^H$ in continuation and is willing to pay
  $$R^H = \Delta \beta \cdot \theta X^H.$$  
- The investor’s profit is:
  $$\Pi_{np} = -F - (1 - \theta) \cdot \beta^L \cdot F + \theta \cdot [\Delta \beta \cdot \theta X^H - \beta^H \cdot F]$$
  $$= -F - \beta^L \cdot F + \theta \cdot \Delta \beta \cdot [\theta X^H - F].$$

Optimal Contract:

- $R^H = \theta X^H$.
- $\Delta \beta = 1$, i.e., $\beta^H = 1$ and $\beta^L = 0$.

![Diagram](Image)

- The investor’s payoff is:
  $$\Pi_{np} = \theta^2 X^H - (1 - \theta) F.$$
Predation

- Firm 1 is financed internally.
- Firm 2 needs outside finance.

Predation:

- At cost $c$, firm 1 can decrease firm 2’s $\theta$ by $\Delta \theta$.
- If firm 2 exits, firm 1’s profit in second period increases by $\Delta \pi$.

**Assumption:** Predation may be valuable, i.e.,

$$\Phi \equiv \frac{c}{\Delta \theta \cdot \Delta \pi} < 1.$$ 

- Predation increases firm 2’s exit probability by $\Delta \theta \cdot \Delta \beta$.
- Hence, firm 1 preys if and only if

$$(\Delta \beta \cdot \Delta \theta) \cdot \Delta \pi > c \quad \text{or} \quad \Phi < \Delta \beta.$$ 

**Remarks:**

- The contract minimizing agency problems within the firm ($\beta^H = 1$ and $\beta^L = 0$) maximizes the incentives to prey.
- Predation occurs even if observed (or anticipated) by all parties.
Accommodating Predation

If firm 2 anticipates predation:

- The optimal financial contract is the same as before.
- The investor’s profit is only
  \[ \Pi_p = -F + (\theta - \Delta_\theta) \cdot (\theta X^H - F) \]
  \[ = \Pi_{np} - \Delta_\theta \cdot (\theta X^H - F). \]

Predation-Proof Contract

- Assume for now that firm 2’s financial contract is observed by firm 1.
- Firm 2 can deter predation by reducing \( \Delta_\beta \), i.e., making its financial contract less sensitive to performance.

Deep-Pocket Strategy:

- Keep \( \beta^H = 1 \).
- Increase \( \beta^L \) until \( \Delta_\beta = \Phi \).
- Investors are softer on the firm.

Shallow-Pocket Strategy

- Keep \( \beta^L = 0 \).
- Decrease \( \beta^H \) until \( \Delta_\beta = \Phi \).
- Investors are tougher on the firm.
Optimal Predation-Proof Contract

- The entrepreneur is willing to pay
  \[ R^H = \Delta \beta \cdot \theta X^H = \Phi \cdot \theta X^H. \]

- Investor’s profit
  \[ \Pi_{pp} = -F - \beta^L \cdot F + \theta \cdot \Delta \beta \cdot (\theta X^H - F) \]
  \[ = -F - \beta^L \cdot F + \theta \cdot \Phi \cdot (\theta X^H - F). \]

- Hence, Shallow Pocket is optimal:
  \[ \beta^L = 0 \text{ and } \beta^H = \Phi. \]

- Investor’s profit
  \[ \Pi_{pp} = -F + \theta \cdot \Phi \cdot (\theta X^H - F). \]

Deter vs. Accommodate

- Deterrence is optimal if and only if \( \Pi_{pp} > \Pi_p \), i.e.,
  \[ -F + \theta \cdot \Phi \cdot (\theta X^H - F) > -F + (\theta - \Delta \theta) \cdot (\theta X^H - F) \]

- This can be written as:
  \[ \theta \cdot \Phi > \theta - \Delta \theta. \]
Comments

Remark 1: The predation threat can constitute an entry barrier.

- Cash poor firms will enter the market if and only if
  \[-F + \max\{\theta \Phi; \theta - \Delta \theta\}(\theta X^H - F) > 0.\]

- More restrictive than absent a predation threat:
  \[-F + \theta(\theta X^H - F) > 0.\]

Remark 2: If contracts are not observable, they cannot deter predation.

- Given firm 1’s strategy (i.e., given \(\theta\) or \(\theta - \Delta \theta\)), setting \(\beta^H = 1\) and \(\beta^L = 0\) is optimal.

- \(\Rightarrow\) Firm 1 will always prey.

Implications:

- Competition depends on a firm’s access to internal funds.

- May depend on cross-sectional variation in availability of internal funds.

- Competition can affect internal incentive problems.

- Competitive threats limit the extent to which access to capital depends on performance.

- Important point in optimal capital structure checklist: “Do competitors have deep pockets?”
Signal Jamming Theory

Fudenberg and Tirole (1986).

Main idea:

(1) Investors observe signals about the firm’s profitability.
⇒ Incentives for rivals to distort the signals.

(2) Maybe true even if investors are not fooled in equilibrium.

Model

- At \( t = 1, 2 \), a firm generates i.i.d. cashflows \( X_t \in \{-\infty; +\infty\} \).
- Distribution \( h \in \{h_B, h_G\} \) with \( \nu \equiv \Pr [h = h_G] \).
- Good firm’s NPV > 0 while Bad firm’s NPV < 0:

\[
\int_{-\infty}^{+\infty} X \cdot h_G(X) \cdot dX > 0 > \int_{-\infty}^{+\infty} X \cdot h_B(X) \cdot dX.
\]

Assumption: Monotone Likelihood Ratio Property (MLRP):

\[
\frac{\partial}{\partial X} \left( \frac{h_G(X)}{h_B(X)} \right) > 0.
\]
No Predation

Optimal policy: Terminate the firm after $t = 1$ if and only if

$$X_1 < \hat{X}.$$  

Predation

- A rival can secretly incurs a (tiny) cost so that:

$$X_1 \rightarrow X_1 - \Delta_X.$$  

- If the firm exits, the rival gains $\Delta_\pi$.

Equilibrium?

- If the investors anticipate no predation:
  - They mistakenly liquidate if $\hat{X} - \Delta_X < X_1 - \Delta_X < \hat{X}$.
  - $\Rightarrow$ If predation is not anticipated, there will be predation.
  - $\Rightarrow$ Not an equilibrium.

- If the investors anticipate predation:
  - Absent predation, investors will mistakenly continue if

$$\hat{X} - \Delta_X < X_1 < \hat{X}.$$  

$\Rightarrow$ If predation is anticipated, there will be predation.
$\Rightarrow$ This is an equilibrium.

Note:

- Predation does not fool the investors (i.e., they take the same decisions as without predation).

- Not really general: Here predation does not affect the information content of $X_1$.  

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D. Gromb  
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Comments

- BS and FT models are based on investment-cashflow correlation.
- In FT, the correlation is between cashflows and investment opportunities.
- In BS, the correlation is between cashflows and investment capacity.
- In FT, rivals would jam any observable variable a priori correlated with investment opportunities.
- In BS, rivals need to distort cash-flows.
- In BS, predation affects (only) cash-flow firms.
- In FT, it affects cash-poor firms only in so far as they need to raise funds from investors who are less informed than they are.
Readings (starred articles are recommended):


Surveys, etc.


Related Literature:


PROBLEMS

Problem 1 (Markups and the Business Cycle) (from MIT Finance Generals 2000)

Consider a model with two periods \((t = 1, 2)\), universal risk-neutrality and no discounting. Two all-equity firms, A and B, compete in prices with differentiated goods (goods A and B) and have identical linear technologies, with constant marginal cost \(c\). They face consumers indexed by their “transportation cost” for good A, \(y\), uniformly distributed over \([0, 1]\).

At \(t = 1\), the firms set prices \(p_A^1\) and \(p_B^1\). Consumer \(y\)’s valuation for \(q\) units of good A (resp. B) is \(q \cdot (U_1 - y)\) (resp. \(q \cdot (U_1 - (1 - y))\)) for \(q \leq D\) and flat for \(q \geq D\). Assume that after \(p_A^1\) and \(p_B^1\) have been set, \(D\) takes one of two values, \(D^L = 0\) and \(D^H > 0\) with \(\Pr[D = D^H] = \theta\). Denote \(\hat{D} = \theta D^H\). To simplify, assume that \(U_1\) is large enough so that each consumer chooses \(q = D\).

At \(t = 2\), the firms set prices \(p_A^2\) and \(p_B^2\). Switching costs are large enough so that each consumer is locked with the firm she purchased from at \(t = 1\). Each consumer’s valuation for the good is \(q \cdot U_2\) for \(q \leq 1\) and flat for \(q \geq 1\) (i.e., no transportation costs).

a) Solve for the equilibrium mark-ups at \(t = 1\), i.e., for \(m^i_1 = p^i_1 - c\) with \(i = A, B\).

b) Assume that a boom (resp. recession) at \(t = 1\) corresponds to the demand \(\theta\) being large (resp. small). In this model, are mark-ups pro- or counter-cyclical? Explain briefly.

Now, firm A has debt with face value \(K\) maturing at the end of period \(t = 1\), while firm B remains all-equity. Assume non-verifiable profits in both periods (à la Bolton-Scharfstein (1990)). If firm A defaults, creditors seize its assets and operate them at \(t = 2\). However, their linear technology at \(t = 2\) has marginal cost \(c + \Delta_c\) with \(\Delta_c > 0\).

c) Under what condition will firm A not default when \(D^H > 0\)? From now on, assume this condition to be satisfied.

d) Solve for the equilibrium mark-ups at \(t = 1\), assuming that firms maximize the value of debt and equity.

e) How do both firms’ markups compare to those in a), and to each other? Explain briefly.

f) Show that mark-ups can be pro- or counter cyclical. (Give conditions). Explain briefly.

g) When both firms’ mark-ups are pro-cyclical (resp. counter-cyclical), how do the sensitivities of both firms’ markups to the business cycle compare to those in a), and to each other? Explain briefly.

h) What are, in your view, the main strengths and weaknesses of this model?
Overview:

- Introduction.
- Chevalier and Scharfstein (1994).
Methodological Difficulties

• Causality.

• Do financial choices drive product market decisions? Or is it the other way around?

• What if both are driven by an unobserved third factor?

Inter-Industry Studies

Spence (1985)

• Fact: Firms in more concentrated industries have less leverage.

Interpretations?

• Does low leverage lead to high concentration, say because incumbents with deep pockets deter entry?

• Does high concentration lead to low leverage, say because firms in concentrated markets/industries are more profitable and need less debt to finance investment?

Guedes and Opler (1992)

• Try to explain inter-industry differences in median leverage based on measures of product market competition.

• Also try to explain intra-industry differences in leverage.

• Result: None.

Intra-Industry Studies

Strategy: Within a particular industry, examine the product market effects of significant capital structure changes, e.g., LBOs, recapitalizations, etc.

• Industry selection criteria:
  – Increase of at least 25% in ratio of debt-to-market value of leading firm.
  – C(4) ratio of at least 50%.
  – Product homogeneity.
  – Industry leader with at least 50% of its sales in industry.

• Four industries qualify:
  – Fiberglass Roofing and Insulation.
  – Tractor Trailers.
  – Polyethylene Chemicals.
  – Gypsum.

• Hope: LBO exogenous to changes in product market competition.

• Questions:
  – What happens to LBO firms?
  – What happens to industry?

Basic Finding:

• In first 3 industries:
  – LBO firms either lost market share or did not increase market share when other firms exited the industry.
  – LBO firms experienced decrease in sales and increase in operating margins.
  – Supply curves shift up after the leverage increase, suggesting a decrease in competition.

• For gypsum: just the opposite.
Fiberglass:

- 4 major firms accounting for 75% of sales: Owens-Corning Fiberglass (OCF) (the largest), Manville Corp., Certainteed Corp., PPG Industries.
- After its recap, OCF’s market share dropped from 30.5% to 26.5%.
- Manville was also financially constrained:
  - Filed for Chapter 11 bankruptcy in 1983.
  - Lost 5% of total market share.
- Plant closings:
  - Only one before OCF’s recapitalization, six after.
  - Annual report: Closings are designed to generate funds to meet scheduled interest and principal payments.
- Accounting measures indicate that OCF became more conservative after the recap:
  - Higher margins.
  - Lower sales and capital expenditures.
**Tractors Trailers:**

- Basically commodity pricing.
  - Dealer and service networks pose only barriers to entry.
- 5 major firms: Fruehauf (leader), Dorsey, Monon, Trailmobile, Great Dane.
- All undertook recapitalization or LBO.
- After Fruehauf recapitalization:
  - Prices increase.
  - Quantity falls.
  - Not driven by input prices.
- Plant closings:
  - 10 plant closings during the period.
  - Fruehauf closed 1 the year of the recap., and 4 more after.
  - Trailmobile and Dorsey each close a plant.
  - Trailmobile CEO: “In the past, capacity may have changed hands, but rarely removed.”
- Accounting measures indicate that OCF became more conservative after the recap:
  - Higher margins.
  - Lower sales and capital expenditures.
Polyethylene:

- Produced in large plants that cannot be converted to other use.
- 3 largest firms: Quantum Chemical (largest), Union Carbide, Cain Inc. (smaller).
- All are highly levered:
  - Quantum Chemical and Union Carbide recapitalized.
  - Cain formed by LBO of a DuPont division.
- Plant closings:
  - No plant closings before recaps.
  - After recap, Quantum closes 1 plant and mothballed 2.
  - Reduction in capacity might have been greater without demand increase (capacity utilization rose from 82% to 93%).
- Quantum increased margins, but expanded sales by buying a small competitor.
Gypsum:

- Used in construction and home-building (and in Har-Tru - a synthetic clay used in tennis courts).

- 2 firms account for 50% of sales: U.S. Gypsum (USG), and National Gypsum.

- Both underwent recaps drastically increasing leverage.
  - USG increased debt-to-market by 50 percentage points.
  - National Gypsum use a LBO.

- Market shares:
  - Two smaller, lowly levered firms gained some market share.
  - USG’s market share also increased.

- Price and quantity:
  - Total industry quantity remain stable (opposite of expected).
  - Product price dropped (opposite of expected).
  - Input prices rose (⇒ expect prices to increase even more).

- Plant closings:
  - 4 of 6 plant closings by the two leaders came after USG’s recap.
  - But small fraction of industry capacity.

- USG operating margins decreased, competitors’ margins rose.

- Maybe industry is different:
  - Minimum efficient scale is small relative to market size.
  - Few entry barriers.
### Table 1

**Market descriptions**

Pre-recap figures are the means for three years prior to the leading firm's recapitalization announcement. Post-recap figures are means for three years after the recapitalization, or until the 1990 fiscal year-end. The exact years used in each of the pre- and post-recap numbers for each firm are given in the footnotes. Debt-to-value ratios are one-year pre- and post-recapitalization book value of debt divided by the book value of debt plus the market value of equity. MES stands for minimum efficient scale; low versus high is according to industry self-descriptions.

<table>
<thead>
<tr>
<th>Industry</th>
<th>Three-year % industry sales</th>
<th>Capital structure changes</th>
<th>Technology/ Barriers to entry</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-recap</td>
<td>Post-recap</td>
<td><em>OCF debt/value: Pre-recap = 34%, post = 71%</em></td>
</tr>
<tr>
<td><strong>Fiberglass roofing and insulation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leading firm: Owens–Corning Fiberglass (OCF)*</td>
<td>30.5%</td>
<td>26.5%</td>
<td><em>Pre-recap = 34%, post = 71%</em></td>
</tr>
<tr>
<td>2nd firm: Manville</td>
<td>22.3%</td>
<td>21.8%</td>
<td></td>
</tr>
<tr>
<td>Manville before bankruptcy</td>
<td>27.1%</td>
<td>25.7%</td>
<td></td>
</tr>
<tr>
<td>Next 2 ‘unleveraged’ firms</td>
<td>22.1%</td>
<td>25.7%</td>
<td></td>
</tr>
<tr>
<td><strong>Tractor trailers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leading firm: Fruehauf*</td>
<td>22.4%</td>
<td>16.5%</td>
<td><em>Fruehauf debt/value: Pre-recap = 22%, post = 72%</em></td>
</tr>
<tr>
<td>Top 5 leveraged firms</td>
<td>48.1%</td>
<td>41.6%</td>
<td>Five of top six firms involved in leveraged recap/LBOs.</td>
</tr>
<tr>
<td>Top 5 ‘unleveraged’ firms</td>
<td>19.7%</td>
<td>24.8%</td>
<td></td>
</tr>
<tr>
<td><strong>Polyethylene</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leading firm: Quantum*</td>
<td>21.8%</td>
<td>21.9%</td>
<td><em>Quantum debt/value: Pre-recap = 36%, post = 76%</em></td>
</tr>
<tr>
<td>2nd firm: Union Carbide*</td>
<td>14.2%</td>
<td>13.2%</td>
<td></td>
</tr>
<tr>
<td>3rd firm: Cain Inc.*</td>
<td>6.3%</td>
<td>7.9%</td>
<td><em>Union Carbide debt/value: Pre-recap = 37%, post = 55%</em></td>
</tr>
<tr>
<td>Top 4 ‘unleveraged’ firms</td>
<td>32.1%</td>
<td>34.8%</td>
<td></td>
</tr>
<tr>
<td><strong>Gypsum</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leading firm: USG*</td>
<td>47.7%</td>
<td>51.1%</td>
<td><em>USG debt/value: Pre-recap = 35%, post = 90%</em></td>
</tr>
<tr>
<td>2nd firm: National Gypsum</td>
<td>22.1%</td>
<td>21.6%</td>
<td></td>
</tr>
<tr>
<td>Next 2 ‘unleveraged’ firms</td>
<td>15.7%</td>
<td>22.1%</td>
<td><em>National Gypsum: 1984 LBO.</em></td>
</tr>
</tbody>
</table>

Individual firm data are obtained from industry segment data from firm annual reports for fiberglass and gypsum. Total market size data are from the U.S. Bureau of Mines and the Census Department Annual Survey of Manufacturers for fiberglass and gypsum. Data for tractor trailers are from R.L. Polk & Co. and represents actual unit quantity sales. Data for polyethylene represents rated capacity of plants and are from Modern Plastics, January annual issue.

*Owens–Corning Fiberglass* recapitalization was announced 6/28/86 and completed in November 1986. The three-year averages exclude 1986, representing 1983–1985 for the pre-recap period and 1987–1990 for the post-recap period. The market share for Owens–Corning fiberglass rises to 33% before the recapitalization if some specialty fiberglass products that were sold off are included. The market share decrease would then rise to 8.5 percentage points if the market size of these products were included in the denominator.

*Fruehauf’s recapitalization was announced 6/28/86 and completed in December 1986. The pre-recap period represents 1983–1985. The post-recap period represents 1987–1989. Four other firms (Dorsey, Great Dane, Monon, Trailmobile) recapitalized using LBOs from 1985 to early 1987. The Fruehauf pre- and post-recap periods are used for the market share numbers for the combined five firms. The pre-recap period for Quantum Chemical only represents two years, 1989 and 1990, given that 1991 capacity data was not yet available.

*Quantum Chemical’s recapitalization was announced 12/27/88 and completed in January 1989. The pre-recap period represents years 1986–1988. The post-recap period for Quantum Chemical only represents two years, 1989 and 1990, given that 1991 capacity data was not yet available.

*Cain Inc. was formed by an LBO of DuPont high-density polyethylene plants in 1987. Complicating identification of the post-recap period for Cain, Occidental Petroleum bought these plants nine months later. Thus the same years as Quantum Chemical are used. If the pre-recap period is defined as 1984–1986 for Cain, its market share number would be 5.92%.

*USG’s recapitalization was announced in 5/2/88 and completed in July 1988. The pre-recap period represents 1985–1987. The post-recap period represents 1989–1990. The market share numbers for USG are overstated because USG has sales in some specialty gypsum products which are not separated from general gypsum sales, while the market size from the Bureau of the Mines does not include these products. This overstatement should primarily affect the level and not the change in market share.
## Table 3

**Accounting measures of performance**

Common measures of firm performance using accounting data. Years are relative to the firm's announcement of a recapitalization. Year 0 is the year of the announcement. The announcement date is given under the firm's name. Thus, for Owens-Corning Fiberglas, years 1-3 are 1987-1989. All data are obtained from firm annual reports. Industry numbers represent industry medians for at least three firms at the four- or three-digit SIC code. Industry data are obtained from COMPSTAT. Sales change is the annual percentage change (not multiplied by 100). Operating price-cost operating margin is sales — cost of goods sold + change in inventories divided by sales + change in inventories. This margin is also called the Lerner Index.

<table>
<thead>
<tr>
<th>Firm</th>
<th>Year — 2</th>
<th>Year — 1</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Wilcoxon test Before vs. after: p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Owens-Corning Fiberglas</strong> (announcement date: 8/28/86)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales change</td>
<td>Own</td>
<td>0.097</td>
<td>0.094</td>
<td>—0.125</td>
<td>—0.021</td>
<td>0.060</td>
</tr>
<tr>
<td></td>
<td>Industry (N = 12)</td>
<td>0.090</td>
<td>0.010</td>
<td>0.156</td>
<td>0.068</td>
<td>0.034</td>
</tr>
<tr>
<td>Price-cost margin</td>
<td>Own</td>
<td>0.322</td>
<td>0.328</td>
<td>0.335</td>
<td>0.381</td>
<td>0.381</td>
</tr>
<tr>
<td>(Lerner index)</td>
<td>Industry</td>
<td>0.300</td>
<td>0.290</td>
<td>0.351</td>
<td>0.344</td>
<td>0.343</td>
</tr>
<tr>
<td>Capital expend./Sales</td>
<td>Own</td>
<td>0.043</td>
<td>0.059</td>
<td>0.034</td>
<td>0.045</td>
<td>0.042</td>
</tr>
<tr>
<td></td>
<td>Industry</td>
<td>0.053</td>
<td>0.065</td>
<td>0.049</td>
<td>0.063</td>
<td>0.041</td>
</tr>
<tr>
<td><strong>Froschaff Corporation</strong> (announcement date: 6/24/86)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales change</td>
<td>Own</td>
<td>—0.080</td>
<td>0.047</td>
<td>—0.269</td>
<td>0.068</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>Industry (N = 12)</td>
<td>—0.013</td>
<td>0.020</td>
<td>0.017</td>
<td>0.085</td>
<td>0.20</td>
</tr>
<tr>
<td>Price-cost margin</td>
<td>Own</td>
<td>0.143</td>
<td>0.083</td>
<td>0.190</td>
<td>0.161</td>
<td>0.184</td>
</tr>
<tr>
<td>(Lerner index)</td>
<td>Industry</td>
<td>0.397</td>
<td>0.272</td>
<td>0.258</td>
<td>0.184</td>
<td>0.366</td>
</tr>
<tr>
<td>Capital expend./Sales</td>
<td>Own</td>
<td>0.039</td>
<td>0.031</td>
<td>0.028</td>
<td>0.025</td>
<td>0.019</td>
</tr>
<tr>
<td></td>
<td>Industry</td>
<td>0.035</td>
<td>0.043</td>
<td>0.030</td>
<td>0.019</td>
<td>0.002</td>
</tr>
<tr>
<td><strong>Quantum Chemical</strong> (announcement date: 12/27/88)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales change</td>
<td>Own</td>
<td>0.113</td>
<td>0.554</td>
<td>—0.086</td>
<td>—0.006</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td>Industry (N = 10)</td>
<td>0.196</td>
<td>0.151</td>
<td>0.045</td>
<td>0.033</td>
<td>0.06</td>
</tr>
<tr>
<td>Price-cost margin</td>
<td>Own</td>
<td>0.173</td>
<td>0.220</td>
<td>0.311</td>
<td>0.255</td>
<td>0.366</td>
</tr>
<tr>
<td>(Lerner index)</td>
<td>Industry</td>
<td>0.339</td>
<td>0.384</td>
<td>0.378</td>
<td>0.366</td>
<td>0.366</td>
</tr>
<tr>
<td>Capital expend./Sales</td>
<td>Own</td>
<td>0.070</td>
<td>0.068</td>
<td>0.221</td>
<td>0.175</td>
<td>0.175</td>
</tr>
<tr>
<td></td>
<td>Industry</td>
<td>0.057</td>
<td>0.075</td>
<td>0.090</td>
<td>0.099</td>
<td>0.099</td>
</tr>
<tr>
<td><strong>USG Corporation</strong> (announcement date: 5/2/88)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales change</td>
<td>Own</td>
<td>0.078</td>
<td>0.064</td>
<td>—0.224</td>
<td>—0.025</td>
<td>0.126</td>
</tr>
<tr>
<td></td>
<td>Industry (N = 7)</td>
<td>0.035</td>
<td>0.068</td>
<td>0.045</td>
<td>0.117</td>
<td>0.067</td>
</tr>
<tr>
<td>Price-cost margin</td>
<td>Own</td>
<td>0.376</td>
<td>0.341</td>
<td>0.290</td>
<td>0.309</td>
<td>0.272</td>
</tr>
<tr>
<td>(Lerner index)</td>
<td>Industry</td>
<td>0.322</td>
<td>0.336</td>
<td>0.304</td>
<td>0.307</td>
<td>0.305</td>
</tr>
<tr>
<td>Capital expend./Sales</td>
<td>Own</td>
<td>0.072</td>
<td>0.062</td>
<td>0.038</td>
<td>0.036</td>
<td>0.033</td>
</tr>
<tr>
<td></td>
<td>Industry</td>
<td>0.041</td>
<td>0.038</td>
<td>0.059</td>
<td>0.042</td>
<td>0.075</td>
</tr>
</tbody>
</table>

*Observations are separated into before and after sets. The year of the recapitalization is excluded. The Wilcoxon signed-rank test is a nonparametric test. The null hypothesis is that the before and after measures are from populations with the same distribution and the same medians. The Wilcoxon signed-rank test for the own row includes all firms in the industry. Results were similar in tests excluding the recapitalizing firm. Separate tests for firm versus the industry are not conducted because of the limited number of observations.

*Year 3 is unavailable for Froschaff because it was acquired by another corporation in the third year following the recapitalization. Year 3 was unavailable for Quantum because of the late date of its recapitalization.
### Table 6
Management compensation and shareholder wealth

Regressions test whether changes in management compensation are related to changes in shareholder wealth and sales. The first panel contains the linear estimation. In the loglinear relationship in the second panel, coefficients represent elasticities of management compensation with respect to the independent variables. Coefficients are estimated with a separate intercept (fixed effect) for each executive and for each firm-year. Executives have served a minimum of five years over 1977-1992. The chairman of the board was also the CEO for all four companies. Standard errors are in parentheses.

#### Linear specification (Jensen–Murphy, 1990) – Dependent variable: Change in total compensation* (in 1983 $1000)

<table>
<thead>
<tr>
<th>Change in shareholder wealth</th>
<th>Position dummies</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lagged year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in sales</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chair/CEO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>President</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Execs = 29</td>
<td>0.000429*</td>
<td>335.21</td>
</tr>
<tr>
<td>Exec. years = 201</td>
<td>(0.0000547)</td>
<td>(211.42)</td>
</tr>
<tr>
<td>Before recapitalization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Execs = 24</td>
<td>0.0000643</td>
<td>133.95</td>
</tr>
<tr>
<td>Exec. years = 152</td>
<td>(0.0000549)</td>
<td>(105.23)</td>
</tr>
<tr>
<td>After recapitalization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Execs = 15</td>
<td>0.000571*</td>
<td>542.621</td>
</tr>
<tr>
<td>Exec. years = 49</td>
<td>(0.000167)</td>
<td>(193.04)</td>
</tr>
</tbody>
</table>

#### Loglinear specification (Murphy, 1985) – Dependent variable: Change in log total compensation* (in 1983 $1000)

<table>
<thead>
<tr>
<th>Stock returns*</th>
<th>Change in ln(Sales)</th>
<th>Return on assets*</th>
<th>Position dummies</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Execs = 29</td>
<td>0.252*</td>
<td>0.182</td>
<td>−0.069</td>
<td>0.191</td>
</tr>
<tr>
<td>Exec. years = 201</td>
<td>(0.104)</td>
<td>(0.214)</td>
<td>(0.285)</td>
<td>(0.132)</td>
</tr>
<tr>
<td>Before recapitalization</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Execs = 24</td>
<td>0.058</td>
<td>0.544*</td>
<td>0.098</td>
<td>0.402*</td>
</tr>
<tr>
<td>Exec. years = 152</td>
<td>(0.128)</td>
<td>(0.310)</td>
<td>(0.822)</td>
<td>(0.217)</td>
</tr>
<tr>
<td>After recapitalization</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Execs = 15</td>
<td>0.493*</td>
<td>−0.740</td>
<td>0.308</td>
<td>0.129</td>
</tr>
<tr>
<td>Exec. years = 49</td>
<td>(0.212)</td>
<td>(1.13)</td>
<td>(1.35)</td>
<td>(0.392)</td>
</tr>
</tbody>
</table>

Chow structural change tests reject at the 1% level the hypothesis that the coefficients on shareholder wealth, stock return, and change in sales are the same for the before and after periods. *F* statistics for the Chow tests were 6.12 for the linear and 6.45 for the loglinear regressions.

*Total compensation is defined as the sum of salary, bonus, contingent, and option compensation. Similar results are obtained, available from the author, without including the value of option grants. Any stock grants are included in contingent compensation and are valued at the time of the grant. The relationship is also estimated including changes in the value of existing stockholdings. Results discussed in the text, also available from the author, show that the sensitivity of pay to performance increases following the recapitalization. All compensation data are deflated by the consumer price index.

*Change in shareholder wealth is the change in the aggregate value, deflated by the consumer price index, of common stock including dividends for the current year and the prior year ending in December.

*Stock return is the return including any dividends for the year ending in December.

*Return on assets is the operating cash flow, before any interest payments, divided by the year-end book value of the firm's assets.

*Significant at the 5% level using a two-tailed t test.

*Significant at the 10% level using a two-tailed t test.
What does this behavior mean for the industries?

- Increases in price and decrease in quantity.
- But again, Gypsum is different.

Is this good?

- Are firms more prudent? Are they too prudent?
- Look at management compensation on shareholder wealth and sales.
  - Aligned incentives are an indirect check that firms do the right thing.
  - Before recaps, management compensation increases with sales, and is not sensitive to shareholder wealth.
  - After recaps, returns to shareholders is the dominant predictor of management compensation.

Identifying industry supply and demand:

- Identification is problematic.
  - IO literature usually relies on truly exogenous shocks, e.g., Great Lakes freezing in Porter (1983).
  - Otherwise, coefficients will be very sensitive to specification (functional form, explanatory variables, etc.)
- Unclear why debt enters into supply but not demand.
Questions:

- Cannot rule out alternative interpretations.
- Do LBOs occur in the 3 industries because firms forecast less competition, higher profitability, and thus greater debt capacity?
- Is the increase in competition in Gypsum the result of distress in the industry brought on by plummeting demand from construction industry (as a result of recession)?
- What explains differences across industries? (Can’t really answer because there are only 4 observations.)
- An alternative research strategy may be to narrow the scope.
Chevalier (1995a)

Supermarket Industry

• LBOs:
  – LBOs were common during the 1980s: (19/50 largest supermarket chains \(\simeq 1/4\) sales).
  – One leveraged recap (i.e., firm borrows to pay a large dividend to shareholders, \(> 50\%\) of equity value).
  – Sudden and large changes in leverage: Good for event study.
  – Most LBOs were in response to hostile takeover attempts.

• One industry with many local markets:
  – Industry is not concentrated at the national level but local markets can be highly concentrated.
  – LBOs concern many markets.
  – Avoids pitfalls of inter-industry comparisons.
  – But allows for cross-sectional effects of leverage within industry.

Questions:

• Are LBOs good or bad news for competitors?

• How do competitors react?
Event Study

- Consider largest leveraged transactions over 1985-88:
  - 3 LBOs.
  - 1 leveraged recapitalization.

- Examine the stock price reaction of 13 supermarket chains over 30-day window (to also include takeover announcement).

- Distinguish between:
  - Direct rivals of the LBO firm, i.e., with some stores in same city,
  - Other supermarkets.

Idea:

- If debt makes you soft (tough), positive (negative) stock price reaction is expected for rivals only.

- Control using non-rivals to account for possibility that LBO announcement increases the probability of LBOs in other markets (⇒ premium).
SUR setup to estimate $\delta_{ij}$ in:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \sum_j \delta_{ij} D_{jt} + \varepsilon_{ij}$$

where

- $R_{it}$: firm $i$’s return at date $t$,
- $R_{mt}$: market return (V.W. NYSE/AMEX) at date $t$,
- $D_{jt}$: dummy for window of event $j \in \{1, \ldots, 4\}$.

### Table 3—Event Coefficients

<table>
<thead>
<tr>
<th>Event</th>
<th>Event coefficient for other supermarket chains</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1) Competing</td>
</tr>
<tr>
<td>Safeway LBO</td>
<td>0.003168**</td>
</tr>
<tr>
<td></td>
<td>(0.000966)</td>
</tr>
<tr>
<td>Supermarkets</td>
<td>0.001782</td>
</tr>
<tr>
<td>General LBO</td>
<td>(0.001141)</td>
</tr>
<tr>
<td>Stop &amp; Shop LBO</td>
<td>0.001573</td>
</tr>
<tr>
<td></td>
<td>(0.001381)</td>
</tr>
<tr>
<td>Kroger leveraged</td>
<td>0.001857*</td>
</tr>
<tr>
<td>recapitalization</td>
<td>(0.000930)</td>
</tr>
</tbody>
</table>

**Notes:** Column 1 reports event coefficients for firms competing in some of the same MSA’s as the “event” firm; column 2 reports event coefficients for firms competing in none of the same MSA’s as the “event” firm. The coefficients were estimated using seemingly unrelated regressions. Standard errors are given in parentheses.

*Statistically different from zero at the 5-percent level.

**Statistically different from zero at the 1-percent level.

**Note:** Small positive effect on rival chains. Underestimate: Direct rivals overlap with LBO firm only over a subset of their own markets.
Entry, Exit and Expansion after LBOs

- Entry, exit and expansion of rivals of LBO chains.

Idea:

- If debt makes you weak, one would expect:
  - Expansion by unlevered rival incumbents.
  - Entry into local markets if incumbents have undertaken LBOs.

- Opposite results if debt makes you tough.

Note: Distinction is also helpful because events were recent. One expects incumbents to expand sooner.

Data:

- Entry, exit, and expansion decisions in 85 Metropolitan Statistical Areas (MSAs). Account for 6,068 of the 13,512 supermarkets in these MSAs.
- Classify all firms according to whether they did LBO in the 1980s.

Tricky Issue:

- Asset sales and spin-offs are common after LBOs.
- Should not be counted as entry or expansion by rivals.
- Conservative approach: Assign the assets to the purchaser as of 1985 and look at changes from this level.
- Similar treatment for mergers among non-LBO firms.
Do more/less stores fit in a city? Regress the % change in # of stores in a MSA between 1985-91 on fraction of stores held by a chain that eventually undertook a LBO (+ controls).

### Table 5—OLS Specifications

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficients</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.0070</td>
<td>0.0075</td>
<td>-0.0006</td>
</tr>
<tr>
<td></td>
<td>(0.1386)</td>
<td>(0.1380)</td>
<td>(0.1572)</td>
</tr>
<tr>
<td>Percentage change in households</td>
<td>0.6347**</td>
<td>0.5952**</td>
<td>0.5377**</td>
</tr>
<tr>
<td></td>
<td>(0.1569)</td>
<td>(0.1581)</td>
<td>(0.1651)</td>
</tr>
<tr>
<td>Percentage change in income</td>
<td>-0.6731</td>
<td>-0.7661</td>
<td>-0.5778</td>
</tr>
<tr>
<td></td>
<td>(1.1708)</td>
<td>(1.6374)</td>
<td>(1.1935)</td>
</tr>
<tr>
<td>Percentage change in income squared</td>
<td>0.1974</td>
<td>0.2282</td>
<td>0.1918</td>
</tr>
<tr>
<td></td>
<td>(0.3558)</td>
<td>(0.3537)</td>
<td>(0.3630)</td>
</tr>
<tr>
<td>Change in share with income less than $10,000</td>
<td>-0.0071</td>
<td>-0.0076</td>
<td>-0.0044</td>
</tr>
<tr>
<td></td>
<td>(0.0084)</td>
<td>(0.0084)</td>
<td>(0.0088)</td>
</tr>
<tr>
<td>Percentage change in households per square mile</td>
<td>58.7209</td>
<td>60.0863</td>
<td>52.8402</td>
</tr>
<tr>
<td></td>
<td>(54.0745)</td>
<td>(53.6788)</td>
<td>(54.2677)</td>
</tr>
<tr>
<td>Percentage deviation from mean stores per household</td>
<td>-0.0866</td>
<td>-0.0831</td>
<td>-0.1194</td>
</tr>
<tr>
<td></td>
<td>(0.0575)</td>
<td>(0.0571)</td>
<td>(0.0620)</td>
</tr>
<tr>
<td>Herfindahl index</td>
<td>-0.1079</td>
<td>-0.1171</td>
<td>-0.2920</td>
</tr>
<tr>
<td></td>
<td>(0.2818)</td>
<td>(0.2798)</td>
<td>(0.3036)</td>
</tr>
<tr>
<td>Share LBO</td>
<td>0.0966</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0775)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share early LBO</td>
<td>—</td>
<td>0.1736*</td>
<td>0.1438</td>
</tr>
<tr>
<td></td>
<td>(0.0931)</td>
<td>(0.1369)</td>
<td></td>
</tr>
<tr>
<td>Share late LBO</td>
<td>—</td>
<td>-0.0175</td>
<td>0.0280</td>
</tr>
<tr>
<td></td>
<td>(0.1094)</td>
<td>(0.1141)</td>
<td></td>
</tr>
</tbody>
</table>

Regional dummies included? no no yes

R^2 0.30 0.32 0.34

N 85 85 85

Notes: The dependent variable is the percentage change in the total number of stores in the MSA between 1985 and 1991. Standard errors are in parentheses.

*Significantly different from zero at the 5-percent level.

**Significantly different from zero at the 1-percent level.

- Total # store growth between 1985 and 1991 is higher in markets where the share of LBO firms is higher.

- This effect is more pronounced if the LBOs mainly occurred pre-1988: Reaction takes some time.
Non-LBO incumbents are more likely to expand in markets where the share of LBO firms is higher.

### Table 6—Maximum-Likelihood Estimation Results for Incumbent Firms

<table>
<thead>
<tr>
<th>Variables</th>
<th>A. Non-LBO incumbents</th>
<th></th>
<th>B. LBO incumbents</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>$d\Pr[y = 1]$</td>
<td>$d\Pr[y = -1]$</td>
<td>Coefficient</td>
</tr>
<tr>
<td></td>
<td>(tx)</td>
<td>dx</td>
<td>dx</td>
<td>(tx)</td>
</tr>
<tr>
<td>Change in households</td>
<td>0.0339*</td>
<td>-0.0134</td>
<td>0.0129</td>
<td>-0.0262</td>
</tr>
<tr>
<td></td>
<td>(0.0196)</td>
<td>(2.6440)</td>
<td></td>
<td>(0.0262)</td>
</tr>
<tr>
<td>Change in income</td>
<td>-2.7210</td>
<td>1.0788</td>
<td>-1.0358</td>
<td>3.9310</td>
</tr>
<tr>
<td></td>
<td>(2.0230)</td>
<td>(0.2400)</td>
<td></td>
<td>(2.4103)</td>
</tr>
<tr>
<td>Change in income squared</td>
<td>0.2590</td>
<td>-0.1027</td>
<td>0.0986</td>
<td>-0.3690</td>
</tr>
<tr>
<td></td>
<td>(0.1850)</td>
<td>(0.1764)</td>
<td></td>
<td>(0.2400)</td>
</tr>
<tr>
<td>Change in share with income less than</td>
<td>-0.2128</td>
<td>0.0844</td>
<td>-0.0810</td>
<td>0.2154</td>
</tr>
<tr>
<td>$10,000</td>
<td>(0.1435)</td>
<td>(0.0063)</td>
<td></td>
<td>(0.2400)</td>
</tr>
<tr>
<td>Change in households per square mile</td>
<td>-0.0008</td>
<td>0.0003</td>
<td>-0.0003</td>
<td>0.0005</td>
</tr>
<tr>
<td></td>
<td>(0.0006)</td>
<td>(0.0046)</td>
<td></td>
<td>(0.0063)</td>
</tr>
<tr>
<td>Deviation from mean stores per</td>
<td>0.0010</td>
<td>-0.0004</td>
<td>0.0004</td>
<td>0.0032</td>
</tr>
<tr>
<td>household</td>
<td>(0.0038)</td>
<td>(0.0046)</td>
<td></td>
<td>(0.0063)</td>
</tr>
<tr>
<td>Total stores</td>
<td>-0.0012**</td>
<td>0.0005</td>
<td>-0.0004</td>
<td>0.0007</td>
</tr>
<tr>
<td></td>
<td>(0.0004)</td>
<td>(0.0063)</td>
<td></td>
<td>(0.0063)</td>
</tr>
<tr>
<td>Market share</td>
<td>2.1970*</td>
<td>-0.8711</td>
<td>0.8363</td>
<td>-2.7866*</td>
</tr>
<tr>
<td></td>
<td>(1.0566)</td>
<td>(1.5580)</td>
<td></td>
<td>(1.5580)</td>
</tr>
<tr>
<td>Herfindahl index</td>
<td>2.1396</td>
<td>-0.8483</td>
<td>0.8145</td>
<td>0.1315</td>
</tr>
<tr>
<td></td>
<td>(1.7995)</td>
<td>(3.6680)</td>
<td></td>
<td>(3.6680)</td>
</tr>
<tr>
<td>Share LBO</td>
<td>1.7016*</td>
<td>-0.6746</td>
<td>0.6477</td>
<td>1.7620</td>
</tr>
<tr>
<td></td>
<td>(0.7557)</td>
<td>(1.1292)</td>
<td></td>
<td>(1.1292)</td>
</tr>
<tr>
<td>Exit threshold</td>
<td>0.0996</td>
<td>0.8998</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.6693)</td>
<td>(0.9534)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entry threshold</td>
<td>0.4173</td>
<td>1.3547</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.6697)</td>
<td>(0.9561)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Number of observations: 184

Notes: The dependent variable has the following values: $Y_{ij} = +1$ if firm $i$ withdraws at least one store from market $j$, $Y_{ij} = 0$ if firm $i$ neither adds nor withdraws stores from market $j$, and $Y_{ij} = -1$ if firm $i$ adds stores in market $j$. Standard errors are reported in parentheses.

*Significantly different from zero at the 10-percent level.

**Significantly different from zero at the 5-percent level.

**Significantly different from zero at the 1-percent level.
### Table 7—Maximum-Likelihood Estimation Results for Incumbent Firms

<table>
<thead>
<tr>
<th>Variables</th>
<th>A. Non-LBO incumbents</th>
<th>B. LBO incumbents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Marginal effects</td>
<td>Marginal effects</td>
</tr>
<tr>
<td></td>
<td>( \frac{d \Pr[y = 1]}{dx} )</td>
<td>( \frac{d \Pr[y = -1]}{dx} )</td>
</tr>
<tr>
<td>Change in households</td>
<td>0.0300*</td>
<td>0.0131</td>
</tr>
<tr>
<td></td>
<td>(0.0202)</td>
<td></td>
</tr>
<tr>
<td>Change in income</td>
<td>-2.6630</td>
<td>1.0553</td>
</tr>
<tr>
<td></td>
<td>(2.0190)</td>
<td></td>
</tr>
<tr>
<td>Change in income squared</td>
<td>0.2550</td>
<td>-0.1010</td>
</tr>
<tr>
<td></td>
<td>(0.1850)</td>
<td></td>
</tr>
<tr>
<td>Change in share with income</td>
<td>-0.2125</td>
<td>0.0842</td>
</tr>
<tr>
<td>less than $10,000</td>
<td>(0.1438)</td>
<td></td>
</tr>
<tr>
<td>Change in households per</td>
<td>-0.0008</td>
<td>0.0003</td>
</tr>
<tr>
<td>square mile</td>
<td>(0.0006)</td>
<td></td>
</tr>
<tr>
<td>Deviation from mean stores per</td>
<td>0.0012</td>
<td>-0.0005</td>
</tr>
<tr>
<td>household</td>
<td>(0.0038)</td>
<td></td>
</tr>
<tr>
<td>Total stores</td>
<td>-0.0012***</td>
<td>0.0005</td>
</tr>
<tr>
<td></td>
<td>(0.0004)</td>
<td></td>
</tr>
<tr>
<td>Market share</td>
<td>2.1043*</td>
<td>-0.8339</td>
</tr>
<tr>
<td></td>
<td>(1.0503)</td>
<td></td>
</tr>
<tr>
<td>Herfindahl index</td>
<td>2.0584</td>
<td>-0.8157</td>
</tr>
<tr>
<td></td>
<td>(1.8184)</td>
<td></td>
</tr>
<tr>
<td>Share early LBO</td>
<td>1.7032*</td>
<td>-0.6749</td>
</tr>
<tr>
<td></td>
<td>(0.9073)</td>
<td></td>
</tr>
<tr>
<td>Share late LBO</td>
<td>1.4687</td>
<td>-0.5582</td>
</tr>
<tr>
<td></td>
<td>(0.8865)</td>
<td></td>
</tr>
<tr>
<td>Exit threshold</td>
<td>0.0996</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.6693)</td>
<td></td>
</tr>
<tr>
<td>Entry threshold</td>
<td>0.4173</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.6697)</td>
<td></td>
</tr>
</tbody>
</table>

**Number of observations**: 184 113

**Notes**: The dependent variable has the following values: \( Y_{ij} = -1 \) if firm \( i \) withdraws at least one store from market \( j \), \( Y_{ij} = 0 \) if firm \( i \) neither adds nor withdraws stores from market \( j \), and \( Y_{ij} = +1 \) if firm \( i \) adds stores in market \( j \). Standard errors are reported in parentheses.

*Significantly different from zero at the 10-percent level.

*Significantly different from zero at the 5-percent level.

**Significantly different from zero at the 1-percent level.
<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td></td>
<td>Non-LBO incumbents</td>
</tr>
<tr>
<td></td>
<td>(2)</td>
</tr>
<tr>
<td></td>
<td>LBO incumbents</td>
</tr>
<tr>
<td>Change in households</td>
<td>-0.0660</td>
</tr>
<tr>
<td></td>
<td>(0.1170)</td>
</tr>
<tr>
<td></td>
<td>-0.2690</td>
</tr>
<tr>
<td></td>
<td>(0.2350)</td>
</tr>
<tr>
<td>Change in income</td>
<td>0.2860</td>
</tr>
<tr>
<td></td>
<td>(6.2420)</td>
</tr>
<tr>
<td></td>
<td>14.0750</td>
</tr>
<tr>
<td></td>
<td>(14.1650)</td>
</tr>
<tr>
<td>Change in income squared</td>
<td>0.0900</td>
</tr>
<tr>
<td></td>
<td>(0.5750)</td>
</tr>
<tr>
<td></td>
<td>-1.3100</td>
</tr>
<tr>
<td></td>
<td>(1.2500)</td>
</tr>
<tr>
<td>Change in share with income less than $10,000</td>
<td>-0.4167</td>
</tr>
<tr>
<td></td>
<td>(0.4084)</td>
</tr>
<tr>
<td></td>
<td>0.5441</td>
</tr>
<tr>
<td></td>
<td>(0.9351)</td>
</tr>
<tr>
<td>Change in households per square mile</td>
<td>-0.0033</td>
</tr>
<tr>
<td></td>
<td>(0.0039)</td>
</tr>
<tr>
<td></td>
<td>0.0003</td>
</tr>
<tr>
<td></td>
<td>(0.0352)</td>
</tr>
<tr>
<td>Deviation from mean stores per household</td>
<td>0.0575*</td>
</tr>
<tr>
<td></td>
<td>(0.0250)</td>
</tr>
<tr>
<td></td>
<td>0.0268</td>
</tr>
<tr>
<td></td>
<td>(0.0435)</td>
</tr>
<tr>
<td>Total stores</td>
<td>-0.0055*</td>
</tr>
<tr>
<td></td>
<td>(0.0022)</td>
</tr>
<tr>
<td></td>
<td>-0.0005</td>
</tr>
<tr>
<td></td>
<td>(0.0042)</td>
</tr>
<tr>
<td>Market share</td>
<td>7.0556</td>
</tr>
<tr>
<td></td>
<td>(5.4637)</td>
</tr>
<tr>
<td></td>
<td>-28.1176**</td>
</tr>
<tr>
<td></td>
<td>(10.2838)</td>
</tr>
<tr>
<td>Herfindahl index</td>
<td>29.6984</td>
</tr>
<tr>
<td></td>
<td>(11.9950)</td>
</tr>
<tr>
<td></td>
<td>30.6566</td>
</tr>
<tr>
<td></td>
<td>(27.0131)</td>
</tr>
<tr>
<td>Share, early LBO</td>
<td>7.9665*</td>
</tr>
<tr>
<td></td>
<td>(4.1466)</td>
</tr>
<tr>
<td></td>
<td>0.7648</td>
</tr>
<tr>
<td></td>
<td>(5.7235)</td>
</tr>
<tr>
<td>Share, late LBO</td>
<td>-1.0105</td>
</tr>
<tr>
<td></td>
<td>(3.9945)</td>
</tr>
<tr>
<td></td>
<td>-5.8049</td>
</tr>
<tr>
<td></td>
<td>(9.0537)</td>
</tr>
<tr>
<td>Constant</td>
<td>-6.4550*</td>
</tr>
<tr>
<td></td>
<td>(3.1960)</td>
</tr>
<tr>
<td></td>
<td>-3.2238</td>
</tr>
<tr>
<td></td>
<td>(6.7199)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.12</td>
</tr>
<tr>
<td>Number of observations</td>
<td>184</td>
</tr>
<tr>
<td></td>
<td>113</td>
</tr>
</tbody>
</table>

**Notes:** The dependent variable is the number of stores that firm $i$ has added to market $j$. It is negative if the firm has subtracted stores from market $j$. White (1980) robust standard errors are in parentheses.

*Significantly different from zero at the 10-percent level.

*Significantly different from zero at the 5-percent level.

**Significantly different from zero at the 1-percent level.
Firms are more likely to enter markets where the share of LBO firms is higher (Table 7).

TABLE 9—RESULTS FOR NEW ENTRY

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Marginal effects ( d Pr[y = 1] )</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in households</td>
<td>0.0841*</td>
<td>0.0126</td>
<td>2.23 \times 10^{-6}*</td>
</tr>
<tr>
<td></td>
<td>(0.0395)</td>
<td></td>
<td>(1.13 \times 10^{-6})</td>
</tr>
<tr>
<td>Change in income</td>
<td>4.6880</td>
<td>0.7038</td>
<td>1.15 \times 10^{-4}</td>
</tr>
<tr>
<td></td>
<td>(2.9970)</td>
<td></td>
<td>(7.0 \times 10^{-5})</td>
</tr>
<tr>
<td>Change in income squared</td>
<td>-0.4950*</td>
<td>-0.0743</td>
<td>1.22 \times 10^{-9}*</td>
</tr>
<tr>
<td></td>
<td>(0.2910)</td>
<td></td>
<td>(6.75 \times 10^{-10})</td>
</tr>
<tr>
<td>Change in share with income less than $10,000</td>
<td>0.2859</td>
<td>0.0429</td>
<td>0.0702</td>
</tr>
<tr>
<td></td>
<td>(0.1806)</td>
<td></td>
<td>(0.0388)</td>
</tr>
<tr>
<td>Change in households per square mile</td>
<td>-0.0025</td>
<td>-0.0004</td>
<td>4.19 \times 10^{-4}</td>
</tr>
<tr>
<td></td>
<td>(0.0032)</td>
<td></td>
<td>(3.97 \times 10^{-4})</td>
</tr>
<tr>
<td>Deviation mean stores per household</td>
<td>0.0012</td>
<td>0.0002</td>
<td>6.95 \times 10^{-4}</td>
</tr>
<tr>
<td></td>
<td>(0.0064)</td>
<td></td>
<td>(0.0021)</td>
</tr>
<tr>
<td>Herfindahl index</td>
<td>0.0887</td>
<td>0.0133</td>
<td>0.0147</td>
</tr>
<tr>
<td></td>
<td>(2.9218)</td>
<td></td>
<td>(1.0290)</td>
</tr>
<tr>
<td>Share, early LBO's</td>
<td>2.4183*</td>
<td>0.3630</td>
<td>0.7904*</td>
</tr>
<tr>
<td></td>
<td>(1.1330)</td>
<td></td>
<td>(0.3835)</td>
</tr>
<tr>
<td>Share, late LBO's</td>
<td>0.6756</td>
<td>0.2960</td>
<td>0.2960</td>
</tr>
<tr>
<td></td>
<td>(1.2177)</td>
<td></td>
<td>(0.4317)</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.518</td>
<td>0.0758</td>
<td>0.0758</td>
</tr>
<tr>
<td></td>
<td>(1.0364)</td>
<td></td>
<td>(0.3248)</td>
</tr>
</tbody>
</table>

\( R^2 \) | 0.2010

Notes: The first column shows probit results. The dependent variable has the following values: \( Y_j = 0 \) if no entry occurs in market \( j \); \( Y_j = 1 \) if entry occurs. The second column shows the marginal effects implied by the coefficients in column 1. The third column shows the results of the linear probability specification. Entry occurs in 39 of the 85 markets. Standard errors are reported in parentheses.

*Significantly different from zero at the 10-percent level.

*Significantly different from zero at the 5-percent level.
An Alternative Hypothesis

- Could it be that LBO firms were always poor performers so that entry and expansion would have occurred even if LBO did not take place?

- Responses:
  
  (a) Asset Sales.
  (b) Accounting Performance.
  (c) Event study evidence.
  (d) Early vs. late LBO’s.
<table>
<thead>
<tr>
<th>Accounting ratio</th>
<th>Mean</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LBO firm</td>
<td>Non-LBO firm</td>
<td>t statistic of difference</td>
</tr>
<tr>
<td>Operating income/sales</td>
<td>0.0363</td>
<td>0.0395</td>
<td>0.48</td>
</tr>
<tr>
<td>Net income/sales</td>
<td>0.0040</td>
<td>0.0043</td>
<td>0.14</td>
</tr>
<tr>
<td>Market value/book value of assets</td>
<td>0.8316</td>
<td>0.8194</td>
<td>0.10</td>
</tr>
<tr>
<td>Capital expenditures/assets</td>
<td>0.1461</td>
<td>0.1300</td>
<td>0.80</td>
</tr>
<tr>
<td>Retained earnings/net income</td>
<td>0.3703</td>
<td>0.3266</td>
<td>0.76</td>
</tr>
<tr>
<td>Dividends/net income</td>
<td>0.2375</td>
<td>0.1896</td>
<td>0.39</td>
</tr>
</tbody>
</table>
Chevalier and Scharfstein (1994)

- “Fact”: Markups seem to be countercyclical, i.e., during recessions, output prices rise relative to real factor prices.

Theories:

- Increasing returns to scale. ⇒ Costs are procyclical. (But, in fact, real factor prices decrease).
- Less elastic demand in recessions (+ imperfect competition).
- Collusion is more difficult in booms (high stakes in deviations).
- Greater financial constraints in recessions:
  - Pricing for market share due to switching costs.
  - Low prices are an investment: Lower short-run profit, higher long-run market share and profit.
  - Financially constrained firms cannot price for market share.

Predictions:

- Hypothesis 1: A firm’s markups should be more countercyclical if it is more financially constrained.
- Hypothesis 2: Markups should be more countercyclical if rivals are more financially constrained because prices are strategic complements.
- Hypothesis 3: Average industry-wide markup should be more countercyclical if firms are more financially constrained.
Empirical Approach

• Examines supermarkets at the local market (i.e., city) level.

• Consider exogenous events in which:
  – the liquidity of supermarkets in a city is reduced;
  – within the same city, some supermarkets (Group 1) are more affected than others (Group 2).

• Hypothesis: In response to a shock affecting a city,
  \[ \Delta m_1 > \Delta m_2 \text{ or } \Delta(\Delta m) > 0 \]

• However, we observe prices, but not marginal costs.

Idea 1: Look at changes in prices

\[ \Delta(\Delta p) = \Delta(\Delta m) + \Delta(\Delta c) \]

If we observe (as we will) that \( \Delta(\Delta p) > 0 \) we can conclude:

• either \( \Delta(\Delta m) > 0 \),

• or \( \Delta(\Delta c) > 0 \), i.e., the marginal costs of more financially constrained firms increased relative to less constrained firms.

Idea 2: Use \( \Delta(\Delta p) \) in cities not (or less) affected by the shock:

• Hard to see why \( \Delta(\Delta c) \) would differ across local markets.

• If \( \Delta(\Delta p) = \Delta(\Delta c) > 0 \), we should expect \( \Delta(\Delta(\Delta p)) = 0 \).

• If \( \Delta(\Delta(\Delta p)) > 0 \) then part of the action is likely due to \( \Delta(\Delta m) \).
Experiment 1: 1986 Oil Shock

• Exogenous shock:
  – Oil prices drop 50% ⇒ Severe downturn in “oil states”.
  – Clean example of local shock.

• Distinguish between supermarkets owned:
  – by local and regional chains (Group 1),
  – or by national chains (Group 2).

• Assumption: In oil states, the oil shock affected local chains more than national chains.

Data:

• Period:
  – from 1985Q4: prices begin falling in 1986Q1;
  – to 1987Q1: Texas employment at trough + oil prices level off.

• 100 MSAs, including 22 cities in oil states.

• Price index for each MSA:
  – Basket of 27 grocery products, $i = 1,...$
  – City average price for grocery product $i$.
  – City price index
    \[ p_j = \sum_i w_i \cdot \left( \frac{p_{ij}}{\sum_k p_{ik}} \right). \]
  – PRICE: Average over all (if several) cities in MSA.
• ΔPRICE: % "increase" in MSA's price index over the period.

• Measures of a city's exposure to the oil shock:
  
  
  – OILIMP: share of oil and gas extraction in 1985 earnings.
  
  – ΔEMP: % change in employment in city's state over period as measure of direct effect of shock on local economy. (Note: Change in unemployment would ignore migration).

• ΔWAGE: % change in wages of "sales and occupation" workers at MSA level over period.

---

**Table 1—Summary Statistics: The Oil Shock of 1986**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Variable</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔPRICE</td>
<td>-0.006</td>
<td>NATSHARE × OILIMP</td>
<td>0.005</td>
</tr>
<tr>
<td>(0.049)</td>
<td></td>
<td>(0.008)</td>
<td></td>
</tr>
<tr>
<td>NATSHARE</td>
<td>0.347</td>
<td>ΔEMP</td>
<td>-0.003</td>
</tr>
<tr>
<td>(0.229)</td>
<td></td>
<td>(0.033)</td>
<td></td>
</tr>
<tr>
<td>OILDUM</td>
<td>0.220</td>
<td>NATSHARE × ΔEMP</td>
<td>-0.002</td>
</tr>
<tr>
<td>(0.232)</td>
<td></td>
<td>(0.014)</td>
<td></td>
</tr>
<tr>
<td>NATSHARE × OILDUM</td>
<td>0.109</td>
<td>ΔWAGE</td>
<td>0.058</td>
</tr>
<tr>
<td>(0.232)</td>
<td></td>
<td>(0.389)</td>
<td></td>
</tr>
<tr>
<td>OILIMP</td>
<td>0.011</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0.017)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: This table reports summary statistics for the sample of 100 observations analyzed in Table 2. ΔPRICE is the percentage change in the local supermarket price index over the period 1985:4 to 1987:1. NATSHARE is the fraction of a city's stores that are owned by national chains. OILIMP is the share of a state's earnings accounted for by oil and gas production. OILDUM is a dummy variable that takes the value 1 if the city is in a state in which OILIMP is greater than 2 percent. ΔEMP is the percentage change in employment in the city's state over this period. ΔWAGE is the percentage change in wages of a sample of workers in sales occupations according to the Current Population Survey. Standard deviations are reported in parentheses below the means.
**Hypothesis 3:** Average industry-wide markup should be more countercyclical if firms are more financially constrained.

(1) Regress $\Delta \text{PRICE}$ on $\text{NATSHARE} \times \text{OILDUM}$ controlling for

- $\text{NATSHARE}$,
- $\text{OILDUM}$, e.g., the fall in demand in the oil states could reduce prices relative to other states,
- $\Delta \text{WAGE}$, e.g., labor costs could rise in oil state cities dominated by national chains.

(2) and (3): Repeat with alternative measures of city’s exposure to the oil shock $\text{OILIMP}$ and $\Delta \text{EMP}$.
- NATSHARE: Indistinguishable from zero, i.e., National chains' importance has no impact on prices in non-oil state cities.

- OILDUM: Statistically insignificant.

- ΔWAGE: Positive as expected; Statistically insignificant.

- NATSHARE × OILDUM: Negative and significant.

- Similar results with alternative measures of exposure to shock.

**Interpretation:** In states more severely hit by the oil shock, prices fall more in cities with a larger share of national chains.
Experiment 2:  
LBOs and the 1990-91 Recession

• Exogenous shock:
  – Recession.
  – Clean example of local shock.

• Distinguish between supermarkets owned:
  – by LBO chains (Group 1),
  – or non-LBO chains (Group 2).

• Assumption: Recession put more pressure on LBO firms to boost short-run cash flows to meet higher principal and interest payments.

Data:

• Period:
  – from quarter previous to peak: 1990Q2,

• 59 MSAs.
• LBOSHARE: Share of all stores in a city owned by LBO chains.

**Hypothesis 3:** Average industry-wide markup should be more countercyclical if firms are more financially constrained.

Regress $\Delta \text{PRICE}$ on $\text{LBOSHARE} \times \Delta \text{EMP}$ controlling for

- $\Delta \text{EMP}$: city’s exposure to recession,
- LBOSHARE,
- $\Delta \text{WAGE}$.

**Results:**

- LBOSHARE not statistically significantly different from zero.
- $\text{LBOSHARE} \times \Delta \text{EMP}$ is negative and significant.
- $\Delta \text{EMP}$ positive but statistically insignificant.
- $\Delta \text{WAGE}$ positive but statistically insignificant.
### Table 3—Summary Statistics: 1990–1991 Recession

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>(Standard Deviation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔPRICE</td>
<td>0.006</td>
<td>(0.029)</td>
</tr>
<tr>
<td>LBOSHARe</td>
<td>0.246</td>
<td>(0.194)</td>
</tr>
<tr>
<td>ΔEMP</td>
<td>−0.022</td>
<td>(0.016)</td>
</tr>
<tr>
<td>LBOSHARe × ΔEMP</td>
<td>−0.005</td>
<td>(0.006)</td>
</tr>
<tr>
<td>ΔWAGE</td>
<td>0.035</td>
<td>(0.236)</td>
</tr>
</tbody>
</table>

*Notes:* This table reports summary statistics for the sample of 59 observations analyzed in Table 4. ΔPRICE, the percentage change in a city’s price index from 1990:2 to 1991:1. LBOSHARe is the fraction of a city’s stores that are owned by chains that undertook a leveraged buyout during the 1980’s. ΔEMP is the percentage change in employment in the city’s state during the period. ΔWAGE is the percentage change in wages of a sample of workers in sales occupations according to the Current Population Survey. Standard deviations are reported in parentheses below the means.

### Table 4—Regression Results: 1990–1991 Recession

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>(Standard Error)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBOSHARe</td>
<td>−0.024</td>
<td>(0.788)</td>
</tr>
<tr>
<td>LBOSHARe × ΔEMP</td>
<td>−1.970</td>
<td>(1.767)</td>
</tr>
<tr>
<td>ΔEMP</td>
<td>0.384</td>
<td>(1.005)</td>
</tr>
<tr>
<td>ΔWAGE</td>
<td>0.0173</td>
<td>(1.052)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.010</td>
<td>(0.864)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.095</td>
<td></td>
</tr>
</tbody>
</table>

*Notes:* This table reports regression results where the dependent variable is ΔPRICE, the percentage change in a city’s price index from 1990:2 to 1991:1. LBOSHARe is the fraction of a city’s stores that are owned by chains that undertook a leveraged buyout during the 1980’s. ΔEMP is the percentage change in employment in the city’s state during the period. ΔWAGE is the percentage change in wages of a sample of workers in sales occupations according to the Current Population Survey. There are 59 observations. t statistics are in parentheses below the estimated coefficients.
Experiment 3:
LBOs after 1990-91: Firm-Specific Data

- Implications for firm-level prices.
- Hypotheses: A firm’s markups should be more countercyclical:
  1. if it is more financially constrained;
  2. if its rivals are more financially constrained.
- Again, separate LBO vs. non-LBO firms.
- Use geographic heterogeneity in the recovery from recession:
  - Trough in 1991Q1.

Data:

- 110 firms in local market.
- Price:
  - Average over a basket of products.
  - Per chain in an area.
  - Note: nominal price.
• For each firm:
  
  – OLBOSHARE: share of stores in local market owned by LBO chain other than the firm itself.
  – \( \Delta \text{EMP} \).
  – \( \Delta \text{WAG.E} \)

• \( \Delta \text{EMP} \): average 2% (recovery) but negative in some states (California).
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔPRICE</td>
<td>0.023</td>
<td>0.080</td>
</tr>
<tr>
<td></td>
<td>(0.028)</td>
<td>(0.031)</td>
</tr>
<tr>
<td>LBO</td>
<td>0.382</td>
<td>0.393</td>
</tr>
<tr>
<td>LBO × ΔEMP</td>
<td>0.007</td>
<td>0.010</td>
</tr>
<tr>
<td></td>
<td>(0.012)</td>
<td>(0.021)</td>
</tr>
<tr>
<td>OLBOSHARE</td>
<td>0.149</td>
<td>0.151</td>
</tr>
<tr>
<td></td>
<td>(0.151)</td>
<td>(0.146)</td>
</tr>
<tr>
<td>OLBOSHARE × ΔEMP</td>
<td>0.002</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.007)</td>
</tr>
<tr>
<td>ΔEMP</td>
<td>0.020</td>
<td>0.030</td>
</tr>
<tr>
<td></td>
<td>(0.015)</td>
<td>(0.028)</td>
</tr>
<tr>
<td>ΔWAGE</td>
<td>0.053</td>
<td>0.124</td>
</tr>
<tr>
<td></td>
<td>(0.221)</td>
<td>(0.266)</td>
</tr>
</tbody>
</table>

Notes: This table reports summary statistics for the sample analyzed in Table 6. ΔPRICE is the percentage change in a firm’s price index for a particular city in one of two periods, 1991:1 to 1991:4 and 1991:1 to 1992:4. LBO is a dummy variable which takes the value of one if the firm had previously undertaken a leveraged buyout. ΔEMP is the percentage change in employment in the city’s state during the period. OLBOSHARE is the share of stores in the local market owned by LBO chains other than the firm itself. ΔWAGE is the percentage change in wages of a sample of workers in sales occupations according to the Current Population Survey. There are 110 observations in the shorter sample and 89 observations in the longer sample. Standard deviations are reported in parentheses below the means.
Results:
Hypothesis 1:

• LBO: positive and statistically significant:
  – LBO firms tend to raise prices more than non-LBO firms;
  – Two possible interpretations:
    * LBOs increase markups more;
    * marginal costs increase more for LBO chains.

• LBO×ΔEMP: negative and statistically significant:
  – LBO firms tend to raise price more relative to non-LBO firms in cities in which economic recovery is slower;
  – Hard to justify this by difference in difference in marginal costs between LBOs and non-LBOs across different states.

Hypothesis 2:

• OLBOSHARE: positive and statistically significant:
  – Firms tend to raise prices more in market where LBO rivals are important;

• OLBOSHARE×ΔEMP: negative and statistically significant:
  – Effect is more pronounced in local markets in which economic recovery is slower;
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LBO</strong></td>
<td></td>
<td>0.030</td>
<td>0.025</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3.235)</td>
<td>(2.670)</td>
</tr>
<tr>
<td><strong>LBO × ΔEMP</strong></td>
<td></td>
<td>-1.131</td>
<td>-0.402</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-2.942)</td>
<td>(-1.659)</td>
</tr>
<tr>
<td><strong>OLBOSHARE</strong></td>
<td></td>
<td>0.109</td>
<td>0.120</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3.454)</td>
<td>(3.456)</td>
</tr>
<tr>
<td><strong>OLBOSHARE × ΔEMP</strong></td>
<td></td>
<td>-2.834</td>
<td>-1.152</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-2.184)</td>
<td>(-1.389)</td>
</tr>
<tr>
<td><strong>ΔEMP</strong></td>
<td></td>
<td>0.712</td>
<td>0.375</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.578)</td>
<td>(1.807)</td>
</tr>
<tr>
<td><strong>ΔWAGE</strong></td>
<td></td>
<td>-0.004</td>
<td>-0.011</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-0.333)</td>
<td>(-0.892)</td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td></td>
<td>-0.003</td>
<td>0.050</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-0.413)</td>
<td>(5.044)</td>
</tr>
<tr>
<td>$R^2$</td>
<td></td>
<td>0.179</td>
<td>0.200</td>
</tr>
<tr>
<td>Number of observations</td>
<td></td>
<td>110</td>
<td>89</td>
</tr>
</tbody>
</table>

Notes: This table reports regression results where the dependent variable is ΔPRICE, the percentage change in a firm's price index for a particular city over two different time periods, 1991:1, 1991:4 and 1991:1–1992:4. ΔEMP is the state employment change during the period; LBO is a dummy variable equal to 1 if the firm undertook an LBO; LBOEMP is LBO multiplied by ΔEMP; OLBOSHARE is a measure of the market shares of the other supermarket chains that undertook leveraged buyouts; OLBOEMP is OLBOSHARE multiplied by ΔEMP. There are 110 observations in the shorter sample and 89 observations in the longer sample. t statistics are in parentheses below the estimated coefficients.
Readings (starred articles are recommended):


Surveys, etc.


Related Literature:


• **What is the course about?** A thorough, doctoral level survey of both theory and empirical work in Corporate Finance. We will cover a wide range of topics (see the tentative schedule below).

• **Who can attend?** The course’s content and style are targeted at doctoral students in Accounting, Economics and Finance. All other London Business School students are welcome to attend. All doctoral students from other universities are also welcome.

• **Where/When?** Wednesdays, 2:00pm-5:00pm at London Business School, room E202.

• **Course format:** There are 9 meetings. I will distribute lecture notes and papers in class. There is no textbook.

• **Course spirit:** Good.

• **How to get credit for the course?** Weekly assignments (problem sets, referee reports on a paper, etc.). To be discussed in class.

**Very Tentative Schedule**

• This schedule is tentative. It will be updated. This schedule is also excessively full. We will not actually cover all these topics in class. I will distribute lecture notes and readings for topics we cover but also for some of those we do not. Which topics we actually cover will depend on students (and faculty)’ interests and mood.

**WEEK 1: WEDNESDAY 30TH APRIL**

*The Modigliani Miller Theorem*

*Taxes and Bankruptcy Costs*


*Incentive Problems*


*Information Asymmetry Problems*


**WEEK 2: WEDNESDAY 7TH MAY**

*Capital Structure: Theories*


Capital Structure: Empirics

Corporate Investment

Week 3: Wednesday 14th May

Financial Distress and Bankruptcy: Theories

How Firms Fair in Financial Distress

Theories of Optimal Financial Contracting

**WEEK 4: WEDNESDAY 21ST MAY**

*Corporate Control Theories*

• Hart, Oliver D. (1995), Firms, Contracts and Financial Structure, Oxford University Press. Chapters 1, 2, 3 and 5.

*Financial Intermediaries: Theory*


**WEEK 5: WEDNESDAY 28TH MAY**

*Relationship Banking: Empirics*


*Banks as Liquidity Providers: Empirics*


*Debt Structure: Theory*


*Trade Credit*

*Banking: Empirics*, by Prof. Viral Acharya.
Corporate Governance, by Prof. Paolo Volpin


WEEK 6: WEDNESDAY 4TH JUNE

Theories of Takeovers and Control Transfers


Takeovers: Empirics


Dividend Policy


Initial Public Offerings: Theories


Initial Public Offerings: Empirics, by Prof. David Goldreich.

WEEK 7: WEDNESDAY 11TH JUNE

Managerial Behavior (and How to Curb It): Theories


Corporate Risk Management


Corporate Diversification and Internal Capital Markets: Theories


Corporate Diversification: Empirics, by Prof. Henri Servaes

WEEK 8: WEDNESDAY 18TH JUNE

Corporate Finance and Product Markets


Corporate Finance, Financial Development and Growth

WEEK 9: WEDNESDAY 25TH JUNE

Entrepreneurial Finance

• Gromb, Denis, and David S. Scharfstein (2002), “Entrepreneurship in Equilibrium,” mimeo LBS and MIT.

Corporate Finance Implications for Financial Markets

• Krishnamurthy, Arvind, 2000, Collateral constraints and the amplification mechanism, Working paper, Northwestern University.

Other Topics We Might Cover: Managerial Behavior: Empirics; Monetary Policy and Corporate Finance; Law and Finance; Corporate Finance and Behavioral Finance; Behavioral Corporate Finance; Historical Perspective on Corporate Finance.