# Financing Constraints & Corporate Investment

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***اگر این مقاله را نخوانده‌اید، این کلاس <u>هیچ</u> ارزش افزوده‌ای برای شما نخواهد داشت.***

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# Introduction

- In perfect capital markets, a firm's investment decisions are independent of its financial condition.
- External funds provide a perfect substitute for internal capital??
- Financial factors affecting on investment?
- Effects of IA on Internal OR External Financing?

***COMMENTS?????***

# Hypothesis Basics

- If the cost disadvantage of external finance is small, retention practices should reveal little or nothing about investment: firms will simply use external funds to smooth investment when internal finance fluctuates, regardless of their dividend policy.

- If the cost disadvantage is significant, firms that retain and invest most of their income may have no low-cost source of investment finance, and their

# Theoretical Background

- Modigliani-Miller
- Jorgenson and ... (neoclassical theory)
- Mayer, Majluf
- Greenwald, Stiglitz, Weiss
- King and Auerbach
- Akerlof

# Raw Data

**Table 1. Sources of Funds, by Asset Class, U.S. Manufacturing Firms, 1970–84**

| *Firm size* | *Source of funds (percent of total)*[a] | | | | *Percentage of long-term debt from banks* | *Average retention ratio* |
|---|---|---|---|---|---|---|
| | *Short-term bank debt* | *Long-term bank debt* | *Other long-term debt* | *Retained earnings* | | |
| All firms | 0.6 | 8.4 | 19.9 | 71.1 | 29.6 | 0.60 |
| *Asset class* | | | | | | |
| Under $10 million | 5.1 | 12.8 | 6.2 | 75.9 | 67.3 | 0.79 |
| $10–50 million | 5.9 | 17.4 | 6.9 | 69.8 | 71.6 | 0.76 |
| $50–100 million | 3.1 | 12.9 | 5.3 | 78.7 | 71.0 | 0.68 |
| $100–250 million | −0.2 | 13.3 | 12.0 | 74.9 | 52.4 | 0.63 |
| $250 million–$1 billion | −2.3 | 10.6 | 15.4 | 76.3 | 40.8 | 0.56 |
| Over $1 billion | −0.6 | 4.8 | 27.9 | 67.9 | 14.7 | 0.52 |

Source: Authors' calculations based on data taken from U.S. Department of Commerce, Bureau of the Census, *Quarterly Financial Reports of Manufacturing, Mining, and Trade Corporations*, various issues. The data underlying the calculations are expressed in 1982 dollars.

a. Funds raised from new equity issues are excluded from the calculations.

**What is your idea about Depreciation?**

# Why internal finance is less costly than new share issues and debt finance?

- Transaction Cost
- Tax Advantages
- Agency Problems
- Cost of Financial Distress
- Asymmetric Information

***YOUR IDEA????***

# New Share Issues

$$r = \rho/(1-\tau)(1-c)$$

$$s = \rho/(1-\tau)(1-\theta)$$

$$(1-\theta)/(1-c) < 1$$

r: cost of internal finance

s: cost of new share issues

$\theta$: tax on dividends

c: tax on capital gains

# Lemons

- Lemon Problem…
- Lemon Premium
- Financing Hierarchy
- q Model of Investment

- Y: gross returns from assets in place
- Y’: return from a new project
- I: cost of the new investment
- V: market value assigned to good firms and lemons

NEW SHARES WILL BE ISSUED ONLY IF:

$$Y'/I \geq Y/V$$

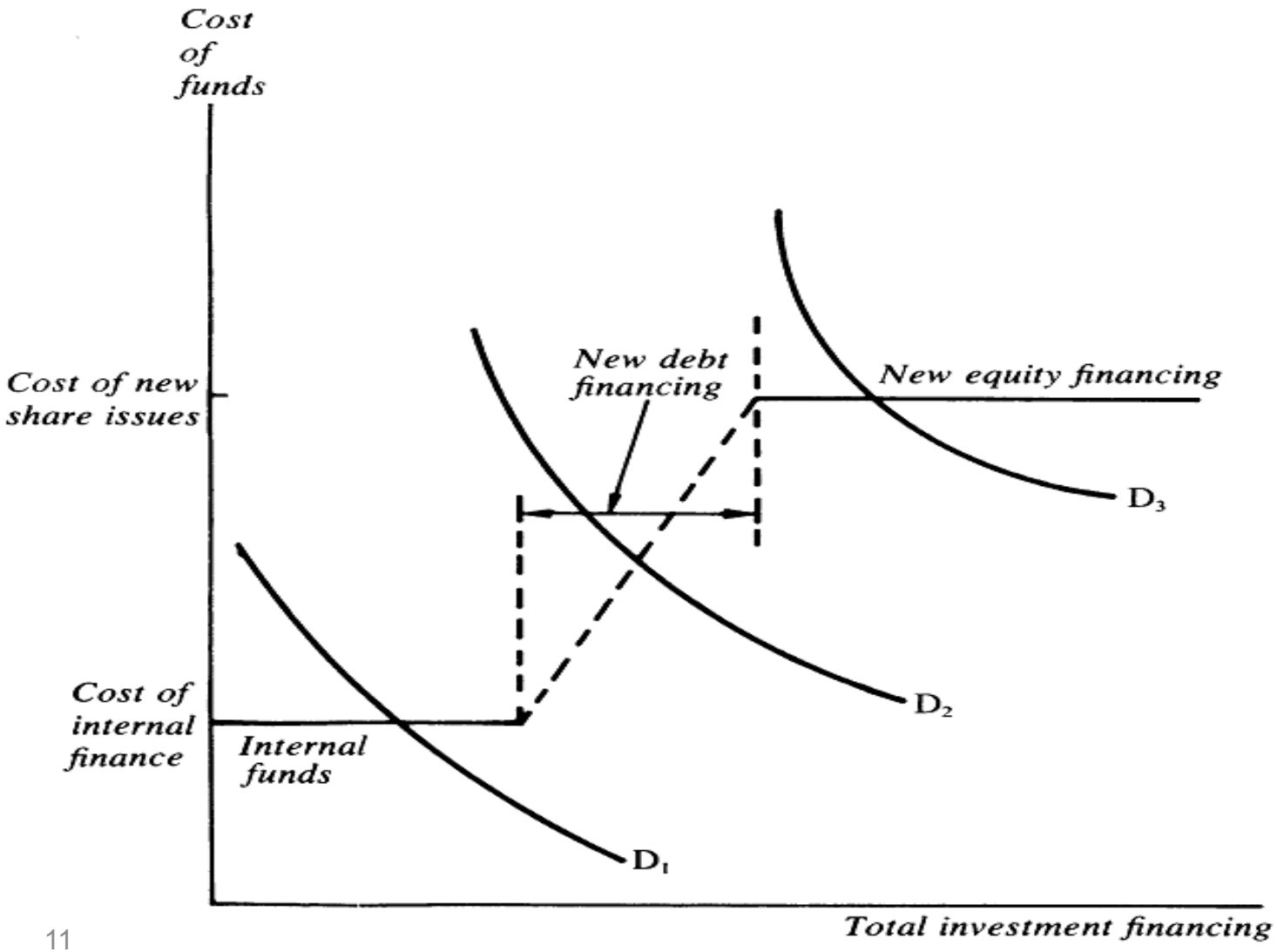
# Debt Finance

- Agency Prblems
- Managers' Actions (NPV & Risk Issues)
- Covenants
- Covenants and fund availability
- Fund availability and fund expense
- Rise of interest rate and lenders' Adverse Selection Problem (extra interest on unknown borrowers)

***What about Heterogeneity?***

# Financing Hierarchies

**Figure 1. Investment and Financing Decisions**




- q and information asymmetry
- q and new issuance

# Data and firm categorizing

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

| *Statistic* | *Category of firm* | | |
|---|---|---|---|
| | *Class 1*[a] | *Class 2*[b] | *Class 3*[c] |
| Number of firms | 49 | 39 | 334 |
| Average retention ratio | 0.94 | 0.83 | 0.58 |
| Percent of years with positive dividends | 33 | 83 | 98 |
| Average real sales growth (percent per year) | 13.7 | 8.7 | 4.6 |
| Average investment-capital ratio | 0.26 | 0.18 | 0.12 |
| Average cash flow–capital ratio | 0.30 | 0.26 | 0.21 |
| Average correlations of cash flow with investment (deviations from trend)[d] | 0.92 | 0.82 | 0.20 |
| Average of firm standard deviations of investment-capital ratios | 0.17 | 0.09 | 0.06 |
| Average of firm standard deviations of cash flow–capital ratios | 0.20 | 0.09 | 0.06 |
| Capital stock (millions of 1982 dollars) | | | |
| Average capital stock, 1970 | 100.6 | 289.7 | 1,270.0 |
| Median capital stock, 1970 | 27.1 | 54.2 | 401.6 |
| Average capital stock, 1984 | 320.0 | 653.4 | 2,190.6 |
| Median capital stock, 1984 | 94.9 | 192.5 | 480.8 |

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.

# New issuance

**Table 3. New Share Issues, Tobin's $q$, and Debt Statistics for Manufacturing Firms, 1970–84**

| *Item* | *Class 1* | *Class 2* | *Class 3* |
|---|---|---|---|
| Average percentage of years with new share issues | 28 | 19 | 10 |
| Average value of share issues as a percentage of cash flow | 23 | 13 | 8 |
| Average annual $q$ values[a] | 3.8 | 2.4 | 1.6 |
| | (0.4) | (0.2) | (0.1) |
| Median $q$ values | 1.6 | 1.4 | 1.0 |
| Average difference in $q$ values between periods of new share issues and periods of no new share issues[a] | 1.6 | 0.9 | 0.2 |
| | (0.8) | (0.4) | (0.1) |
| Average ratio of debt to capital stock | 0.57 | 0.52 | 0.33 |
| Average ratio of interest payments to sum of interest payments plus cash flows | 0.27 | 0.21 | 0.17 |
| Correlation of the earnings-to-capital ratio and the change in total debt-to-capital ratio (averaged over firms) | 0.23 | 0.15 | 0.09 |

Source: Same as table 2.
a. The standard error of the mean appears in parentheses.

Why?

# Model

$$(I/K)_{it} = f(X/K)_{it} + g(CF/K)_{it} + u_{it},$$

$$(I/K)_{it} = \mu_i + \mu_1 Q_{it} + u_{it},$$

# Q Model of investment

**Table 4. Effects of *Q* and Cash Flow on Investment, Various Periods, 1970–84**[a]

| *Independent variable and summary statistic* | *Class 1* | *Class 2* | *Class 3* |
|---|---|---|---|
| | | *1970–75* | |
| $Q_{it}$ | 0.0010 | 0.0072 | 0.0014 |
| | (0.0004) | (0.0017) | (0.0004) |
| $(CF/K)_{it}$ | 0.670 | 0.349 | 0.254 |
| | (0.044) | (0.075) | (0.022) |
| $\bar{R}^2$ | 0.55 | 0.19 | 0.13 |
| | | *1970–79* | |
| $Q_{it}$ | 0.0002 | 0.0060 | 0.0020 |
| | (0.0004) | (0.0011) | (0.0003) |
| $(CF/K)_{it}$ | 0.540 | 0.313 | 0.185 |
| | (0.036) | (0.054) | (0.013) |
| $\bar{R}^2$ | 0.47 | 0.20 | 0.14 |
| | | *1970–84* | |
| $Q_{it}$ | 0.0008 | 0.0046 | 0.0020 |
| | (0.0004) | (0.0009) | (0.0003) |
| $(CF/K)_{it}$ | 0.461 | 0.363 | 0.230 |
| | (0.027) | (0.039) | (0.010) |
| $\bar{R}^2$ | 0.46 | 0.28 | 0.19 |

Source: Authors' estimates of equation 3 based on a sample of firm data from Value Line data base. See text and Appendix B.

a. The dependent variable is the investment-capital ratio $(I/K)_{it}$, where $I$ is investment in plant and equipment and $K$ is beginning-of-period capital stock. Independent variables are defined as follows: $Q$ is the sum of the value of equity and debt less the value of inventories, divided by the replacement cost of the capital stock adjusted for corporate and personal taxes (see Appendix B); $(CF/K)_{it}$ is the cash flow–capital ratio. The equations were estimated using fixed firm and year effects (not reported). Standard errors appear in parentheses.

# Robustness

**Table 5. Effects of $Q$ and Cash Flow on Investment: Consideration of Measurement Error, 1970–84**[a]

| *Independent variable and summary statistic* | *Ordinary least squares*[b] | *Ordinary least squares*[b] *with (CF/K)* | *Instrumental variable*[b,c] | *First difference*[d] | *Second difference*[e] |
|---|---|---|---|---|---|
| | | | *Class 1* | | |
| $Q_{it}$ | 0.0045 | 0.0008 | 0.0065 | −0.0021 | −0.0040 |
| | (0.0004) | (0.0004) | (0.0009) | (0.0006) | (0.0010) |
| $(CF/K)_{it}$ | . . . | 0.464 | 0.455 | 0.496 | 0.457 |
| | | (0.027) | (0.029) | (0.034) | (0.040) |
| $\bar{R}^2$ | 0.23 | 0.46 | 0.53 | 0.25 | 0.22 |
| | | | *Class 2* | | |
| $Q_{it}$ | 0.0073 | 0.0046 | 0.0035 | 0.0106 | 0.0090 |
| | (0.0009) | (0.0009) | (0.0011) | (0.0015) | (0.0019) |
| $(CF/K)_{it}$ | . . . | 0.363 | 0.418 | 0.268 | 0.364 |
| | | (0.039) | (0.038) | (0.046) | (0.054) |
| $\bar{R}^2$ | 0.17 | 0.28 | 0.28 | 0.14 | 0.13 |
| | | | *Class 3* | | |
| $Q_{it}$ | 0.0044 | 0.0020 | 0.0024 | 0.0032 | 0.0036 |
| | (0.0002) | (0.0003) | (0.0004) | (0.0004) | (0.0005) |
| $(CF/K)_{it}$ | . . . | 0.230 | 0.238 | 0.223 | 0.228 |
| | | (0.010) | (0.010) | (0.013) | (0.014) |
| $\bar{R}^2$ | 0.11 | 0.19 | 0.19 | 0.08 | 0.07 |

Source: Same as table 4.

a. Dependent variable is the investment-capital ratio $(I/K)_{it}$. All variables are as defined in table 4, note a. Standard errors appear in parentheses.

b. Estimated using fixed firm and year effects.

c. The instrumental variable procedure uses lagged $Q$ as an instrument for $Q$.

d. All variables expressed as first differences.

e. All variables expressed as second differences.

Interpretation?

# Alternative Specifications

**Table 6. Effects of $Q$ and Cash Flow on Investment: Alternative Specifications, Various Periods, 1970–84** [a]

| *Independent variable and summary statistic* | *Class 1* | | *Class 2* | | *Class 3* | |
|---|---|---|---|---|---|---|
| | *1970–79* | *1970–84* | *1970–79* | *1970–84* | *1970–79* | *1970–84* |
| | | | *Model with additional cash flow lags* | | | |
| $Q_{it}$ | −0.0002 | 0.0007 | 0.0059 | 0.0044 | 0.0011 | 0.0011 |
| | (0.0004) | (0.0004) | (0.0011) | (0.0009) | (0.0003) | (0.0003) |
| $(CF/K)_{it}$ | 0.508 | 0.400 | 0.245 | 0.304 | 0.146 | 0.168 |
| | (0.035) | (0.029) | (0.059) | (0.045) | (0.015) | (0.012) |
| $(CF/K)_{i,t-1}$ | 0.216 | 0.167 | 0.100 | 0.095 | 0.092 | 0.116 |
| | (0.045) | (0.039) | (0.062) | (0.053) | (0.021) | (0.018) |
| $(CF/K)_{i,t-2}$ | 0.179 | 0.115 | 0.132 | 0.073 | 0.116 | 0.074 |
| | (0.043) | (0.037) | (0.063) | (0.052) | (0.020) | (0.017) |
| $\bar{R}^2$ | 0.54 | 0.49 | 0.23 | 0.30 | 0.16 | 0.21 |
| | | | *Model including lagged Q* | | | |
| $Q_{it}$ | 0.0037 | 0.0033 | 0.0064 | 0.0052 | 0.0014 | 0.0015 |
| | (0.0015) | (0.0013) | (0.0016) | (0.0014) | (0.0004) | (0.0004) |
| $Q_{i,t-1}$ | 0.0011 | 0.0015 | 0.0004 | −0.0002 | 0.0011 | 0.0008 |
| | (0.0006) | (0.0006) | (0.0015) | (0.0013) | (0.0004) | (0.0003) |
| $(CF/K)_{it}$ | 0.528 | 0.426 | 0.287 | 0.345 | 0.183 | 0.225 |
| | (0.041) | (0.030) | (0.059) | (0.041) | (0.014) | (0.010) |
| $\bar{R}^2$ | 0.58 | 0.53 | 0.22 | 0.29 | 0.14 | 0.20 |

Source: Same as table 4.

# Accelerations Investments Demand Model

**Table 7. Effects of Sales and Cash Flow on Investment, 1970–84**[a]

| *Independent variable and summary statistic* | *Class 1* | *Class 2* | *Class 3* |
|---|---|---|---|
| | *Model with sales-capital ratio and Q* | | |
| $Q_{it}$ | −0.0004 | 0.0049 | 0.0019 |
| | (0.0004) | (0.0009) | (0.0003) |
| $(CF/K)_{it}$ | 0.286 | 0.178 | 0.086 |
| | (0.035) | (0.047) | (0.013) |
| $(S/K)_{it}$ | 0.042 | 0.047 | 0.029 |
| | (0.007) | (0.009) | (0.002) |
| $(S/K)_{i,t-1}$ | −0.013 | −0.021 | −0.003 |
| | (0.011) | (0.011) | (0.003) |
| $(S/K)_{i,t-2}$ | 0.029 | 0.015 | 0.008 |
| | (0.012) | (0.011) | (0.003) |
| $(S/K)_{i,t-3}$ | −0.036 | −0.012 | −0.009 |
| | (0.009) | (0.008) | (0.003) |
| $\bar{R}^2$ | 0.54 | 0.34 | 0.24 |

# Neoclassical Investments Model

**Table 8. Effects of Cost of Capital and Cash Flow on Investment, 1970–84**[a]

| *Independent variable and summary statistic* | *Class 1* | *Class 2* | *Class 3* |
|---|---|---|---|
| | *Model with adjusted sales–cost of capital ratio and Q* | | |
| $Q_{it}$ | 0.0005 | 0.0050 | 0.0020 |
| | (0.0004) | (0.0009) | (0.0003) |
| $(CF/K)_{it}$ | 0.319 | 0.248 | 0.163 |
| | (0.033) | (0.044) | (0.011) |
| $(J/K)_{it}$ | 0.275 | 0.190 | 0.086 |
| | (0.043) | (0.038) | (0.009) |
| $(J/K)_{i,t-1}$ | −0.114 | −0.090 | −0.030 |
| | (0.073) | (0.053) | (0.012) |
| $(J/K)_{i,t-2}$ | 0.158 | 0.051 | 0.026 |
| | (0.079) | (0.055) | (0.012) |
| $(J/K)_{i,t-3}$ | −0.125 | −0.037 | 0.003 |
| | (0.060) | (0.043) | (0.010) |
| $\bar{R}^2$ | 0.53 | 0.32 | 0.21 |

# Thanks for your attention

# Comments Or Questions…?

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