Accretive Corporate Decision-Making

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Lecture Notes

Many corporate policies are chosen with accretion and dilution in mind

An "accretive" policy causes a firm's EPS forecast to rise. "Dilutive" policies lower a company's EPS forecast.

"Corporate executives are playing a game that involves showing high and ever-rising earnings per share."

—The Washington Post (2020)

Managers "need a simple metric of performance…[and] the market has selected EPS to fulfill this role."

—Almeida (2019)

CEOs "view earnings, especially EPS, as the key metric for an external audience."

—Graham, Harvey, and Rajgopal (2005)

♠★ Right or wrong, this is the reality we live in! ★♣

What is an earnings per share (EPS) forecast?

An earnings per share (EPS) forecast represents a firm's expected earnings over the next twelve months divided by its current share count

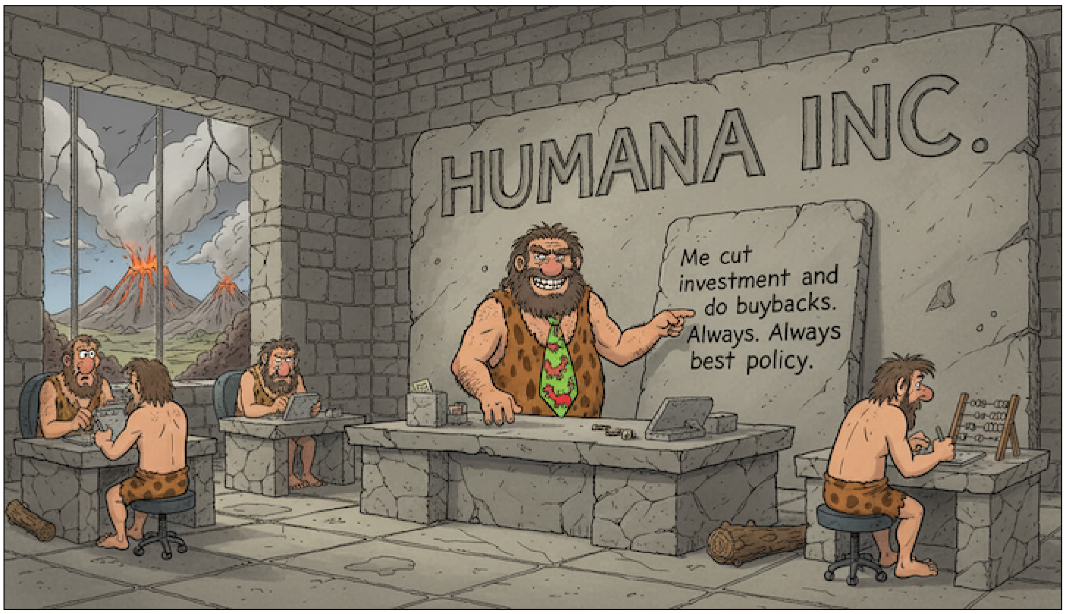
$$\begin{aligned}\mathbb{E}[\text{EPS}] &= \frac{\mathbb{E}[\text{Earnings}]}{\#\text{Shares}} \\ &= \frac{\mathbb{E}[\text{NOI}] - \bar{\imath} \cdot \text{Debt} + \text{rf} \cdot \text{Cash}}{\#\text{Shares}}\end{aligned}$$

$\mathbb{E}[\text{NOI}]$ is net operating income from company's existing assets over the next year.

$\bar{\imath} \cdot \text{Debt}$ is the firm's promised interest expense next year. $\bar{\imath}$ is average interest rate on existing debt.

$\text{rf} \cdot \text{Cash}$ is the riskfree interest income on unused cash. rf is riskfree rate (e.g., 10Y Treasury yield).

Many researchers think they already understand the implications of pursuing short-term EPS growth



This isn't how EPS maximization works!

♠★ The truth is so much more interesting!! ★♣

These lecture notes outline theory of accretive corporate decision-making

Instead of treating max EPS as a mistake or a heuristic, we analyze the objective on its own terms.

Imagine that you are a CEO who wants to increase your EPS forecast. What accretive policies should you pursue? Which dilutive policies should you avoid?

Not saying CEOs should make decisions this way. But, right or wrong, many policies are chosen in the pursuit of short-term EPS growth. Academic researchers need to understand the economic implications.

Accretion and dilution aren't all that matters.
But they do matter! Every policy isn't chosen
to max present value of shareholder payouts.

The people running large public companies must answer three fundamental questions:

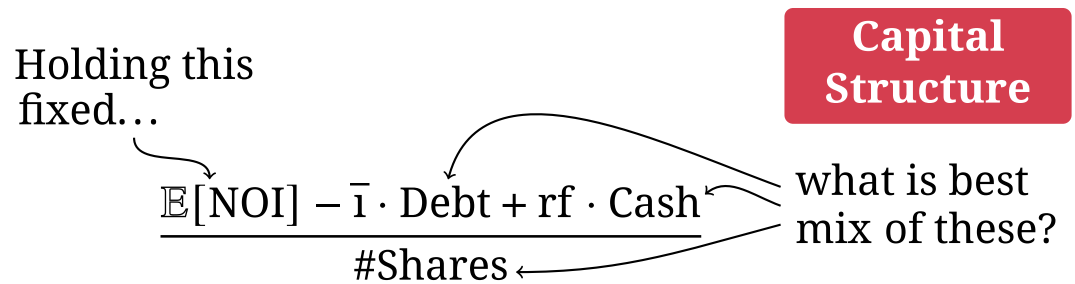
#1) Capital structure. What's the best way to finance my company's existing assets? Borrow? Issue equity? Use a mix of the two? In that case, how much of each?

#2) Real investment. Which new assets should I acquire? Does it make sense to build this production facility, acquire that company, fund a research lab?

#3) Payout policy. At what point should I return cash to shareholders? How should I distribute the money: by paying a dividend or by repurchasing shares?

"Three pillars of corporate finance"
—Damodaran (2014)

EPS maximization speaks to all three pillars!



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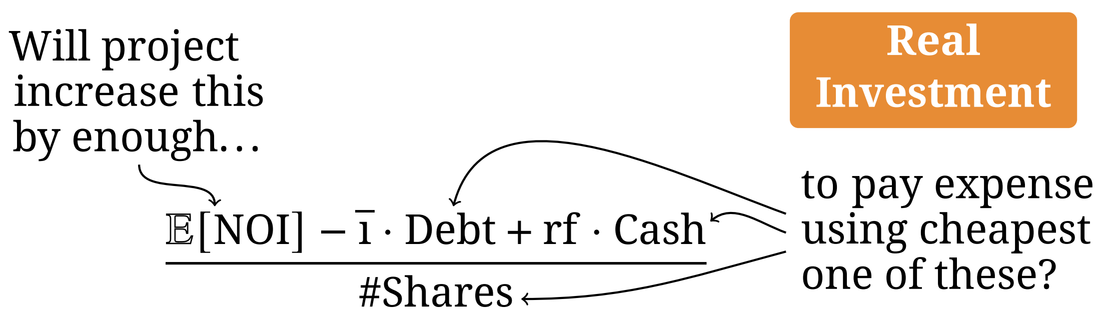

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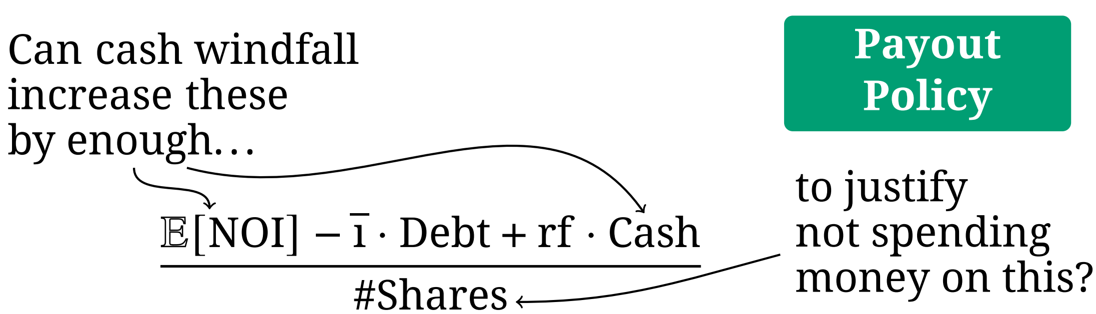

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Accretive capital structure
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EPS maximizers try to finance existing assets at lowest earnings cost. Cost of capital is yield, not discount rate!

$$\underbrace{\begin{array}{r}\text{Equity issuance}\\ \text{Borrowing}\\ \text{Spend free cash}\end{array}}_{\text{Where \$1 comes from}} \qquad \underbrace{\begin{array}{r}\text{EY} \times \$1\\ \text{i} \times \$1\\ \text{rf} \times \$1\end{array}}_{\substack{\text{Earnings hit}\\ \text{next year}}}$$

$\text{EY} = \frac{\mathbb{E}[\text{EPS}]}{\text{Price}}$ is earnings yield. i is marginal interest rate.

Debt-financed buybacks are dilutive when equity is cheap compared to marginal \$1 of debt, $\text{EY} < \text{i}$.

$\max \text{EPS}$ gives theory of “growth” and “value” stocks:

- Growth ($\text{EY} < \text{rf}$). Use zero leverage because last \$1 equity cheaper than first \$1 riskfree debt.
- Value ($\text{EY} > \text{rf}$). First \$1 riskfree debt is cheaper. Lever up to equate marginal funding costs, $\text{EY} = \text{i}$.

Accretive real investment

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EPS maximizers evaluate projects by comparing

$$\underbrace{\mathbb{E}[\Delta\text{NOI}]}_{\substack{\text{Income that project}\\ \text{will add next year}}} \quad \text{vs.} \quad \underbrace{\text{HR} \times \text{Cost}}_{\substack{\text{Financing expense that}\\ \text{must be paid next year}}}$$

Hurdle rate is firm's cheapest funding source

$$\text{HR} = \min\left\{ \underset{\text{Equity}}{\text{EY}}, \underset{\text{Debt}}{\text{i}}, \underset{\substack{\text{Free}\\ \text{cash}}}{\text{rf}} \right\}$$

Accretive projects generate enough income next year to cover their own short-term funding requirements

$$\text{Invest iff} \quad \mathbb{E}[\Delta\text{NOI}] > \text{HR} \times \text{Cost}$$

This is max EPS analog to positive-NPV rule

max EPS ≠ min Investment

IRR and payback period both

follow from max EPS thinking

Accretive payout policy

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EPS maximizers retain cash when they can get higher yield by investing \$1, either in Treasuries or in projects, than by using money to buy back shares

$$\text{Retain cash iff} \quad \underbrace{\text{CY} \times \$1}_{\substack{\text{Income from} \\ \text{investing \$1}}} > \underbrace{\text{EY} \times \$1}_{\substack{\text{Accretive pop} \\ \text{buying back \$1}}}$$

Growth stocks ($\text{EY} < \text{rf}$). Cash too expensive to spend but cheap enough to retain. Fund projects with equity, $\text{CY} = \text{rf}$. Keep cash on balance sheet. Park in Treasuries.

Value stocks ($\text{EY} > \text{rf}$). Cash cheap to spend but might be too expensive to retain. Higher EY makes cash preferred source of project funding BUT ALSO makes it harder to pass up the accretive pop from buying back shares.

EPS maximizers prefer buybacks to dividends. Marginal value stocks ($\text{EY} \approx \text{rf} + \epsilon$) most likely to pay dividends.

What we're hoping to accomplish

These notes show how EPS maximization provides a coherent framework for corporate-finance research.

By carefully analyzing the logic of accretion and dilution, it's possible to answer the three questions that every CEO cares about: How should I finance my existing assets? Which new projects should I invest in? When should I return cash to shareholders?

We organized our discussion around these three topics. Each one gets its own section: capital structure (Part I); real investment (Part II); and payout policy (Part III).

We're aiming to provide an easy-to-read introduction. Please see review article for a more in-depth account.
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Contents

Part I

Capital structure

Defining the "capital structure" problem

Consider company with \$20B in assets. Firm is expected to produce net operating income of \$800M next year. Stock currently trades at price of \$100/sh.

10Y Treasury yield is rf = 3%.

Company's EPS-maximizing CEO takes share price as given and must decide how to finance existing assets

$$\$20\text{B} = \text{Debt} + \underbrace{\$100/\text{sh} \cdot \#\text{Shares}}_{\text{Equity}}$$

Remaining assets are financed by issuing shares

$$\#\text{Shares} = \frac{\text{Assets} - \text{Debt}}{\text{Price}} = \frac{\$20\text{B} - \text{Debt}}{\$100/\text{sh}}$$

Debt is only choice variable for now. No new projects to invest in. No cash to deploy/distribute.

Leverage ratio

Rather than talking about total debt in levels, it can be helpful to quote the leverage ratio

$$\ell = \frac{\text{Debt}}{\text{Assets}} \in [0\%, 100\%)$$

Company has \$20B in assets and trades at \$100/sh. So, if CEO uses zero leverage, $\ell = 0\%$, then she must issue

$$\#\text{Shares}_0 = \frac{\text{Assets}}{\text{Price}} = \frac{\$20\text{B}}{\$100/\text{sh}} = 200\text{M}$$

The more a CEO borrows, the fewer shares must be issued to fund her existing asset base

$$\begin{aligned}\#\text{Shares} &= \frac{\text{Assets} - \text{Debt}}{\text{Price}} \\ &= \frac{\text{Assets} - \ell \cdot \text{Assets}}{\text{Price}} \\ &= (1 - \ell) \times \left(\frac{\text{Assets}}{\text{Price}}\right) = (1 - \ell) \times 200\text{M}\end{aligned}$$

Earnings cost of equity

#Shares is denominator in EPS formula, so CEO likes issuing fewer shares all else equal. Logic shapes how she reasons about cost of equity capital.

To EPS maximizer, cost of equity capital is earnings yield

$$\text{EY} = \frac{\mathbb{E}[\text{EPS}]}{\text{Price}}$$

If Price $=$ \$100/sh, then \$100 of equity capital costs $\mathbb{E}[\text{EPS}]$, which means \$1 of equity costs $\text{EY} = \frac{\mathbb{E}[\text{EPS}]}{\$100/\text{sh}}$.

Price-to-earnings (PE) ratio is just another way of quoting the earnings yield

$$\text{PE} = \frac{\text{Price}}{\mathbb{E}[\text{EPS}]} = \left(\frac{1}{\text{EY}}\right)$$

Equity markets are offering \$1 $\times$ PE of capital today in exchange for each \$1 of expected earnings next year.

Earnings cost of debt

$\bar{\imath}$ is average interest rate on company's previously issued bonds. $\bar{\imath} \times \text{Debt}$ is promised interest expense next year.

After deducting the promised interest expense from anticipated net operating income next year, \$800M, company's earnings forecast is

$$\mathbb{E}[\text{Earnings}] = \$800\text{M} - \bar{\imath} \times \text{Debt}$$

$i \geq rf$ is marginal interest rate. $i \times \$1$ is interest payment next year on next \$1 borrowed.

Each additional \$1 that the CEO borrows will lower the numerator in her EPS forecast by $i \times \$1$

$$\begin{aligned}\mathbb{E}\left[\text{Earnings} \,\middle|\, \substack{\text{Borrow} \\ \text{\$1 more}}\right] &= \mathbb{E}[\text{Earnings}] - i \times \$1 \\ &= \$800\text{M} - \bar{\imath} \cdot \text{Debt} - i \times \$1\end{aligned}$$

Unlevered earnings calculations

If CEO uses \$0 of debt to finance existing assets, then her unlevered EPS forecast will be

$$\mathbb{E}_0[\text{EPS}] = \frac{\mathbb{E}[\text{NOI}]}{\#\text{Shares}_0} = \frac{\$800\text{M}}{200\text{M}} = \$4.00/\text{sh}$$

When unlevered, the CEO faces an earnings yield of

$$\text{EY}_0 = \frac{\mathbb{E}_0[\text{EPS}]}{\text{Price}} = \frac{\$4.00/\text{sh}}{\$100/\text{sh}} = 4\%$$

To raise \$1 of equity capital today, CEO must promise $4\% \times \$1 = \$0.04$ of expected earnings next year.

The company's unlevered earnings multiple is

$$\text{PE}_0 = \left(\frac{1}{\text{EY}_0}\right) = \left(\frac{1}{4\%}\right) = 25\times$$

To raise $\$1 \times \left(\frac{1}{4\%}\right) = \$25$ of equity capital today, CEO must promise \$1 of expected earnings next year.

Levering up can be accretive

CEO starts with unlevered $\mathbb{E}_0[\text{EPS}] = \$4.00/\text{sh}$. Would she be better off borrowing Debt = \$1B and only issuing $\frac{\$19\text{B}}{\$100/\text{sh}} = 190\text{M}$ shares ($\ell = 5\%$)?

CEO can borrow first \$1B of debt at rf = 3%, so interest expense would be $3\% \times \$1\text{B} = \$30\text{M}$. Hence, her new EPS forecast would be

$$\underset{\$1\text{B Debt}}{\mathbb{E}[\text{EPS}]} = \frac{\$800\text{M} - \$30\text{M}}{200\text{M} - 10\text{M}} = \$4.05/\text{sh}$$

Why is it accretive to replace \$1B of equity capital with \$1B of riskfree debt? Because company's unlevered earnings yield, $\text{EY}_0 = 4\%$, is above riskfree rate, rf = 3%

$$\{4\% - 3\%\} \times \left(\frac{\$1\text{B}}{200\text{M}}\right) = +\$0.05/\text{sh}$$

If $1B of riskfree debt is good,
then $2B is even better

After borrowing first $1B riskfree, her new EPS forecast is $4.05/sh. With higher earnings yield, $\frac{\$4.05/\text{sh}}{\$100/\text{sh}} = 4.05\%$, and 10M fewer shares, second $1B of riskfree debt now looks even more accretive than the first

$$\{4.05\% - 3\%\} \times \left(\frac{\$1\text{B}}{190\text{M}}\right) = +\$0.055/\text{sh}$$

If CEO borrows $2B riskfree, her EPS forecast would be

$$\underset{\$2\text{B Debt}}{\mathbb{E}[\text{EPS}]} = \frac{\$800\text{M} - \$60\text{M}}{200\text{M} - 20\text{M}} \approx \$4.105/\text{sh}$$

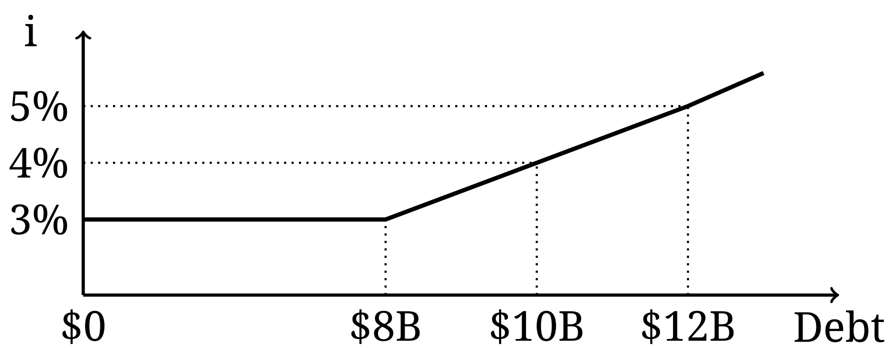
With even higher earnings yield and even fewer shares, third riskfree $1B will deliver even bigger accretive pop

$$\{4.105\% - 3\%\} \times \left(\frac{\$1\text{B}}{180\text{M}}\right) = +\$0.061/\text{sh}$$

Positive feedback loop continues until creditors start increasing marginal interest rate.

Interest-rate schedule

Suppose creditors are willing to lend CEO up to \$8B at rf = 3%. Past that, each additional \$1B of debt will increase marginal interest rate by $\Delta i = +0.5\%$pt.



How firm's interest expense grows as CEO borrows more and more

Each Loan			Cumulative				
	Rate	Int Exp	Total Debt	ℓ	Mgnl Rate	Avg Rate	Int Exp
First \$8B	3.0%	\$240M	\$8B	0.4	3.0%	3.0%	\$240M
Next \$2B	3.5%	\$70M	\$10B	0.5	4.0%	3.1%	\$310M
Next \$2B	4.5%	\$90M	\$12B	0.6	5.0%	3.3%	\$400M
Next \$2B	5.5%	\$110M	\$14B	0.7	6.0%	3.6%	\$510M

There exists an EPS-maximizing choice of leverage even in frictionless model

($\ell = 40\%$) If CEO exhausts riskfree borrowing capacity

$$\underset{\text{\$8B Debt}}{\mathbb{E}[\text{EPS}]} = \frac{\$800\text{M} - \$240\text{M}}{200\text{M} - 80\text{M}} = \$4.67/\text{sh}$$

($\ell = 50\%$) If she also takes on +$2B of risky debt

$$\underset{\text{\$10B Debt}}{\mathbb{E}[\text{EPS}]} = \frac{\$800\text{M} - \$310\text{M}}{200\text{M} - 100\text{M}} = \$4.90/\text{sh}$$

($\ell = 60\%$) If CEO adds another +$2B of risky debt

$$\underset{\text{\$12B Debt}}{\mathbb{E}[\text{EPS}]} = \frac{\$800\text{M} - \$400\text{M}}{200\text{M} - 120\text{M}} = \$5.00/\text{sh}$$

($\ell = 70\%$) If she adds yet another +$2B of risky debt

$$\underset{\text{\$14B Debt}}{\mathbb{E}[\text{EPS}]} = \frac{\$800\text{M} - \$510\text{M}}{200\text{M} - 140\text{M}} = \$4.83/\text{sh}$$

Optimal leverage is $\ell_\star = \frac{\$12\text{B}}{\$20\text{B}} = 60\%$.

Optimal-leverage condition

Company's unlevered earnings yield, $\mathrm{EY}_0 = 4\%$, was above riskfree rate, rf = 3%. Hence, borrowing the first \$1B riskfree increased EPS forecast by

$$\{4\% - 3\%\} \times \left(\frac{\$1\text{B}}{200\text{M}}\right) = +\$0.05/\text{sh}$$

From this, we know this company's EPS-maximizing CEO will use at least some debt

$$\underset{4\%}{\mathrm{EY}_0} > \underset{3\%}{\mathrm{rf}} \qquad \rightsquigarrow \qquad \ell_\star > 0\%$$

Why stop at $\ell_\star = 60\%$? CEO kept borrowing until next \$1 of debt was no longer cheaper than next \$1 of equity

$$\mathrm{EY}(\ell_\star) = \mathrm{i}(\ell_\star) = 5\%$$

In data, we'd see $\mathrm{PE}_\star = \left(\frac{1}{5\%}\right) = 20\times$ for this company.

Debt-financed share repurchases

We have assumed CEO starts with clean slate. Company begins with Debt = \$0B. Then CEO borrows more and more, eventually stopping when $\mathrm{EY}(\ell_\star) = \mathrm{i}(\ell_\star)$.

No need to start from Debt = \$0B. Same logic applies if CEO inherits debt obligations from previous years.

Suppose new CEO takes over company that already has \$10B of debt on its balance sheet. She must decide whether/how to adjust. If CEO maintains status quo

$$\underset{\text{\$10B Debt}}{\mathbb{E}[\text{EPS}]} = \frac{\$800\text{M} - \$310\text{M}}{200\text{M} - 100\text{M}} = \$4.90/\text{sh}$$

If CEO borrows +\$2B more and uses money to repurchase $\frac{\$2\text{B}}{\$100/\text{sh}} = 20\text{M}$ shares, EPS forecast will rise to

$$\underset{\text{\$12B Debt}}{\mathbb{E}[\text{EPS}]} = \frac{\$800\text{M} - \$400\text{M}}{200\text{M} - 120\text{M}} = \$5.00/\text{sh}$$

This is called a “debt-financed share repurchase”.

Buybacks aren't always accretive

EPS maximization doesn't always tell CEOs to buyback shares. If EY $<$ i, then buybacks are dilutive!

It was accretive for CEO to borrow another +\$2B and buy back 20M shares when starting from Debt = \$10B

$$\underset{\text{\$12B Debt}}{\mathbb{E}[\text{EPS}]} = \frac{\$800\text{M} - \$400\text{M}}{200\text{M} - 120\text{M}} = \$5.00/\text{sh}$$

After borrowing \$12B, debt no longer looks cheap compared to equity. If CEO brought her total debt up to \$14B by repurchasing another +\$2B, then she would face marginal interest rate of i = 6%, which is far above EY(0.6) = 5%. So further buy backs would be dilutive

$$\underset{\text{\$14B Debt}}{\mathbb{E}[\text{EPS}]} = \frac{\$800\text{M} - \$510\text{M}}{200\text{M} - 140\text{M}} = \$4.83/\text{sh}$$

$$\{5\% - 6\%\} \times \left(\tfrac{\$2\text{B}}{120\text{M}}\right) \approx -\$0.17/\text{sh}$$

Some firms never borrow to begin with

EPS-maximizing CEOs don't always lever up. To see why, consider otherwise identical company that is expected to generate half as much net operating income next year: $\mathbb{E}[\text{NOI}] = \$400\text{M}$ rather than \$800M.

New company would have unlevered EPS forecast of

$$\mathbb{E}_0[\text{EPS}] = \frac{\$400\text{M}}{200\text{M}} = \$2.00/\text{sh}$$

New company has lower cost of equity capital: $\text{EY}_0 = \frac{\$2.00/\text{sh}}{\$100/\text{sh}} = 2\%$ and $\text{PE}_0 = \left(\frac{1}{2\%}\right) = 50\times$. Can raise same amount of money by promising half as much earnings.

Lower cost of equity makes borrowing first \$1B dilutive

$$\underset{\$1\text{B Debt}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M} - \$30\text{M}}{200\text{M} - 10\text{M}} = \$1.95/\text{sh}$$

Why borrow at $\text{rf} = 3\%$ when you can pay $\text{EY}_0 = 2\%$?

$$\{2\% - 3\%\} \times \left(\frac{\$1\text{B}}{200\text{M}}\right) = -\$0.05/\text{sh}$$

EPS maximization provides natural definition of "growth" and "value"

Literature has defined growth and value stocks in a variety of different ways. In the past, these choices have been empirically motivated. EPS maximization provides theoretical rationale and precise definition.

A growth stock has an earnings yield below the riskfree rate and a PE ratio above the Treasury multiple

$$\mathrm{EY}_0 < \mathrm{rf},\ \mathrm{PE}_0 > \left(\tfrac{1}{\mathrm{rf}}\right) \quad \rightsquigarrow \quad \text{Growth Stock}$$

Equity markets offer growth stocks such cheap financing terms that even riskfree debt seems expensive.

A value stock has an earnings yield above the riskfree rate and a PE ratio below the Treasury multiple

$$\mathrm{EY}_0 > \mathrm{rf},\ \mathrm{PE}_0 < \left(\tfrac{1}{\mathrm{rf}}\right) \quad \rightsquigarrow \quad \text{Value Stock}$$

Value stocks see the first $1 of riskfree debt as cheaper than the last $1 of equity issued.

Why value and growth stocks act differently

There's a reason why researchers have found it helpful to group value and growth stocks together. Empirically, these two kinds of firms have consistently adopted different constellations of corporate policies.

The logic of accretion and dilution explains why…

Transparent economic logic
No new ingredients needed
Easy-to-follow trade-off

A growth stock with $EY_0 = 2\%$ remains unlevered when $rf = 3\%$ because last \$1 of equity capital is $\{2\% - 3\%\} \times \$1 = -\$0.01$ cheaper than first \$1 of riskfree debt.

When $rf = 3\%$, a value stock with $EY_0 = 4\%$ levers up because last \$1 of equity is $\{4\% - 3\%\} \times \$1 = +\$0.01$ more expensive than first \$1 of riskfree debt.

Not based on cross-sectional sort

Historically, literature has classified companies by comparing a firm's PE ratio to that of other companies. e.g., common to label firms with PE ratios below 30%ile as "value" and those above 70%ile as "growth".

Not how things work in max EPS land! Theory says to compare PE ratio with implied Treasury multiple, $\left(\frac{1}{\text{rf}}\right)$.

Rate hike can turn value stock into growth even if PE stays same. Rate cut can turn growth stock into value.

$$\left(\tfrac{1}{2\%}\right) = 50\times \text{ is growth if rf} = 3\% \text{ but value if rf} = 1\%$$
$$\left(\tfrac{1}{4\%}\right) = 25\times \text{ is value if rf} = 3\% \text{ but growth if rf} = 5\%$$

	Interest-rate environment		
	rf = 1%	rf = 3%	rf = 5%
$EY_0 = 2\%$	Value	Growth	Growth
$EY_0 = 4\%$	Value	Value	Growth

EPS maximizers take capital costs as given

CEO's job is to run her company. She doesn't have time to come up with detailed asset-pricing model explaining how her firm should be valued. That's investors' job.

With $\mathrm{EY}_0 = 4\%$ and $\mathrm{rf} = 3\%$, it's accretive
for value-stock CEO to borrow first \$1B

$$\{4\% - 3\%\} \times \left(\frac{\$1\mathrm{B}}{200\mathrm{M}}\right) = +\$0.05/\mathrm{sh}$$

CEO doesn't need to know why her shares
trade at $\mathrm{PE}_0 = \left(\frac{1}{4\%}\right) = 25\times$ when unlevered.

Value-stock CEO stops borrowing at $\ell_\star = \frac{\$12\mathrm{B}}{\$20\mathrm{B}} = 60\%$
because next \$1 of debt and equity equally expensive

$$\mathrm{EY}(\ell_\star) = \mathrm{i}(\ell_\star) = 5\%$$

Doesn't need to know how lenders calculated $\mathrm{i}(\ell_\star) = 5\%$.

Arbitrage without pricing errors

EPS-maximizing CEOs are constantly looking for ways to finance their existing assets with less earnings. They behave like capital-market arbitrageurs.

If $i < EY$, debt financing seems cheap. Each $1 of equity capital ties up more expected earnings than it takes to borrow $1. EPS maximizers buy back shares.

If $EY < i$, equity financing seems cheap. CEO can finance her existing assets with less expected earnings by retiring $1 of debt and issuing $1 of equity.

CEO behaves the same regardless of where share price and interest rate come from. Could both be “correct”. EPS-maximizing CEO will still hunt for a deal.

Explaining time-series trends

The way EPS maximization defines "value" and "growth" allows the market composition to vary over time.

In 1999, the S&P 500 had $\mathrm{PE} \approx 33\times$ while 10Y Treasury yield hovered around $\mathrm{rf} \approx 6\%$. The typical large public company was a growth stock, $\mathrm{EY} = \left(\frac{1}{33\times}\right) = 3\% < \mathrm{rf} = 6\%$. Companies didn't borrow much because it was $\{3\% - 6\%\} \times \$1 = -\$0.03$ cheaper to issue \$1 equity.

After the DotCom crash, PE ratios and interest rates both fell. In 2003, the S&P 500's earnings multiple sat at $\mathrm{PE} \approx 20\times$, and the 10Y Treasury yield was $\mathrm{rf} \approx 4\%$. The typical large public company had become a value stock, $\mathrm{EY} = \left(\frac{1}{20\times}\right) = 5\% > \mathrm{rf} = 4\%$. Issuing \$1 of equity had become $\{5\% - 4\%\} \times \$1 = +\$0.01$ expensive, so companies borrowed more and credit ratings declined as companies walked their way up the supply curve.

Asymmetric interest-rate sensitivity

The max EPS paradigm implies that value and growth stocks will have different reactions to changes in rates.

Value stocks are always one rate cut away from accretive buybacks because they borrow until the next $1 of debt is just as expensive as the next $1 of equity

$$\mathrm{EY}_\star = \mathrm{i}_\star > \mathrm{rf}$$

Growth stocks are more insulated because their cost of equity capital is strictly less than the cost of debt

$$\mathrm{EY}_0 < \mathrm{rf}$$

A small rate cut does not make buybacks accretive for growth stocks. It just makes them slightly less dilutive.

Why M&M capital-structure irrelevance breaks

Modigliani and Miller (1958)'s capital-structure irrelevance theorem is one of the most important results in economics. The entire field organized around it.

The result follows from a single assumption: shareholders and creditors both value their stakes using the same method. If everybody measures their slice of the firm with the same ruler, then debt-vs-equity is zero-sum. $1 diverted to creditors is $1 taken from shareholders.

In max EPS paradigm, CEOs and lenders use different yardsticks, so change in leverage no longer zero-sum. There's a best way to slice the pizza when one person likes toppings and the other prefers the crust.

Accretive financing arrangements are a way for CEO to create value for her shareholders. As saying goes: A dollar saved is a dollar earned. So there is real benefit to finding ways of funding existing assets at lower cost.

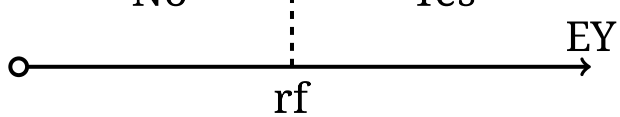
Summary of capital-structure calculations

rf = 3%; Assets = $20B; Price = $100/sh

		Value Stock	Growth Stock
$\mathbb{E}[\text{NOI}]$		\$800M	\$400M
$\mathbb{E}_0[\text{Earnings}]$	$\mathbb{E}[\text{NOI}]$	\$800M	\$400M
$\#\text{Shares}_0$	$\frac{\text{Assets}}{\text{Price}}$	200M	200M
$\mathbb{E}_0[\text{EPS}]$	$\frac{\mathbb{E}[\text{NOI}]}{\#\text{Shares}_0}$	\$4.00/sh	\$2.00/sh
EY_0	$\frac{\mathbb{E}_0[\text{EPS}]}{\text{Price}}$	4%	2%
PE_0	$1/\text{EY}_0$	25×	50×
$\ell_\star$		60%	0%
$\text{Equity}_\star$		\$8B	\$20B
$\text{Debt}_\star$		\$12B	\$0
$\bar{\imath}_\star$		3.33%	·
$\bar{\imath}_\star \times \text{Debt}_\star$		\$400M	\$0
$\mathbb{E}_\star[\text{Earnings}]$	$\mathbb{E}[\text{NOI}] - \bar{\imath}_\star \cdot \text{Debt}_\star$	\$400M	\$400M
$\#\text{Shares}_\star$	$\frac{\text{Assets} - \text{Debt}_\star}{\text{Price}}$	80M	200M
$\mathbb{E}_\star[\text{EPS}]$	$\frac{\mathbb{E}_\star[\text{Earnings}]}{\#\text{Shares}_\star}$	\$5.00/sh	\$2.00/sh
$\text{EY}_\star$	$\frac{\mathbb{E}_\star[\text{EPS}]}{\text{Price}}$	5%	2%
$\text{PE}_\star$	$1/\text{EY}_\star$	20×	50×

Cross-sectional predictions

	Growth EY < rf	**Value** EY > rf
Rel. to riskfree debt, equity is:	Cheap	Expensive
Existing assets financed with:	All equity	Mostly debt
Buybacks can be accretive?	No	Yes



Growth (EY < rf): Low EY makes it cheaper to remain unlevered than to borrow first \$1 riskfree, $\ell_\star = 0$. Buybacks only become accretive if rates fall by enough to convert company into a value stock, $\Delta\text{rf} < \text{EY} - \text{rf}$.

Value (EY > rf): High EY makes first \$1 of riskfree debt cheaper than equity. CEO levers up to equate marginal funding costs, $\text{EY}(\ell_\star) = \text{i}(\ell_\star) > \text{rf}$, which requires exhausting riskfree borrowing capacity, $\ell_\star \gg 0$. Buybacks are accretive any time PE ratios or interest rates fall.

Part II

Real investment

Defining the “real investment” problem

Assume EPS-maximizing CEO has already financed her firm’s existing assets in most accretive way possible.

After choosing $\ell_{\star}$, she learns about new project that costs \$100M today. If funded, project will increase firm’s net operating income next year by $\mathbb{E}[\Delta\text{NOI}_1] = \$4\text{M}$. Delivers same income boost in subsequent years, too.

Project has income yield

$$\text{IY} = \frac{\mathbb{E}[\Delta\text{NOI}_1]}{\text{Cost}} = \frac{\$4\text{M}}{\$100\text{M}} = 4\%$$

Each \$1 spent on project today will add $4\% \times \$1 = \$0.04$ to net operating income next year.

CEO must decide whether or not to fund this \$100M project with IY = 4%. Could be building new production facility, acquiring competitor, funding R&D lab, etc…

★★ max EPS ≠ min Investment ★★

Many academics mistakenly believe that CEOs maximize EPS by cutting investment to zero. This ain't true.

To illustrate, consider $\text{EY}_0 = 2\%$ growth stock. If CEO doesn't invest, her EPS forecast is

$$\underset{\substack{\text{Growth stock} \\ \text{Don't invest}}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M}}{200\text{M}} = \$2.00/\text{sh}$$

If CEO funds project by issuing equity, denominator will increase by $\frac{\$100\text{M}}{\$100/\text{sh}} = +1\text{M}$. Project will also add +$4M to numerator. On net, EPS forecast rises

$$\underset{\substack{\text{Growth stock} \\ \text{Fund w eqty}}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M} + \$4\text{M}}{200\text{M} + 1\text{M}} = \$2.01/\text{sh}$$

Investing is accretive because growth stock can add $4M in income next year at earnings cost of just $2\% \times \$100\text{M} = \$2\text{M}$. Hence, EPS forecast rises by $\frac{\$4\text{M} - \$2\text{M}}{200\text{M}} = +\$0.01/\text{sh}$.

What makes a project accretive?

It's not all about cost minimization. Yes, assets are expensive. But they also generate income. The key question is whether a new asset is expected to generate more income than it takes to finance the upfront cost.

To be accretive, a project must be expected to generate enough additional income next year to pay for its own short-term financing expense

$$\mathbb{E}[\Delta \mathrm{NOI}_1] \;>\; \begin{array}{c}\text{Cheapest earnings cost}\\ \text{of financing next year}\end{array}$$

Project is expected to generate \$4M in net operating income next year. With its sky-high 50× PE ratio, growth stock was able to raise \$100M at earnings cost of $\left(\frac{1}{50}\right) \times$ \$100M = \$2M. Project was accretive because \$4M expected income gain was larger than \$2M funding cost.

Same project can be accretive for one firm but dilutive for another

If value stock doesn't invest, it has EPS forecast

$$\underset{\substack{\text{Value stock}\\ \text{Don't invest}}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M}}{80\text{M}} = \$5.00/\text{sh}$$

Value stock levered up until $\text{EY}_\star = \text{i}_\star = 5\%$. So to borrow extra \$100M, CEO must promise $5\% \times \$100\text{M} = \$5\text{M}$ interest payment next year. This is more than project's \$4M income boost, so debt-financed project is

$$\underset{\substack{\text{Value stock}\\ \text{Fund w debt}}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M} + \$4\text{M} - \$5\text{M}}{80\text{M}} \approx \$4.99/\text{sh}$$

CEO could issue $\frac{\$100\text{M}}{\$100/\text{sh}} = +1\text{M}$ shares. But she only has 80M shares, so +1M increase will be more painful. Effective earnings hit is $5\% \times \$100\text{M} = \$5\text{M}$, so equity-financed project would be equally dilutive

$$\underset{\substack{\text{Value stock}\\ \text{Fund w eqty}}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M} + \$4\text{M}}{80\text{M} + 1\text{M}} \approx \$4.99/\text{sh}$$

Either way, math says $\{4\% - 5\%\} \times \left(\frac{\$100\text{M}}{80\text{M}}\right) \approx -\$0.01/\text{sh}$

Cheapest available source of capital

How little expected earnings needs to be sacrificed next year to raise \$1 of capital today? This minimum financing yield is CEO's "hurdle rate", which we write as

$$\text{HR} = \min\left\{ \underset{\substack{\text{Issue} \\ \text{equity}}}{\text{EY}} , \underset{\substack{\text{Sell} \\ \text{bonds}}}{\text{i}} \right\}$$

Growth stock has $\text{EY}_0 = 2\% < \text{i}_0 = \text{rf} = 3\%$, so

$$\underset{\text{HR}}{2\%} = \min\{ \underset{\text{EY}}{2\%}, \underset{\text{i}}{3\%} \}$$

With access to such cheap equity financing, growth stock prefers to fund new projects by issuing shares.

Value stock levered up until $\text{EY}_\star = \text{i}_\star = 5\% > \text{rf} = 3\%$. To be accretive, CEO of this company requires projects to clear higher yield hurdle

$$\underset{\text{HR}}{5\%} = \min\{ \underset{\text{EY}}{5\%}, \underset{\text{i}}{5\%} \}$$

EPS-maximizing investment rule

To be accretive, project must be expected to generate enough income next year to pay for its own short-term financing expense using the firm's cheapest available source of capital

$$\mathbb{E}[\Delta\text{NOI}_1] \;\; > \;\; \text{HR} \times \text{Cost}$$

Written as a yield spread, the max EPS investment rule tells CEOs to fund any project that satisfies

$$\{\text{IY} - \text{HR}\} \;\; > \;\; 0\%\text{pt}$$

Project that costs \$100M and generates $\mathbb{E}[\Delta\text{NOI}_1] = \$4\text{M}$ next year has $\text{IY} = \frac{\$4\text{M}}{\$100\text{M}} = 4\%$. Growth stock only has to take an earnings hit of $2\% \times \$100\text{M} = \$2\text{M}$ to finance \$100M cost. Hence, project is accretive for growth stock. Investing boosts firm's EPS forecast by

$$\{4\% - 2\%\} \times \left(\frac{\$100\text{M}}{200\text{M}}\right) = +\$0.01/\text{sh}$$

Hurdle rate depends on firm, not project

Textbooks say to use a hurdle rate that depends on project's risk-profile. It doesn't matter where the CEO gets the money from. What matters is project riskiness.

Whereas, in max EPS land, investment hurdle depends on company's financing options. Same project can be accretive for one company and dilutive for another.

It was accretive for value stock to lever up when financing its existing assets. Company now faces $\text{EY}_\star = \text{i}_\star = 5\%$ earnings cost of external capital. This means that CEO will see same \$100M project with identical $\mathbb{E}[\Delta\text{NOI}_1] = \$4\text{M}$ income boost next year as dilutive

$$\{4\% - 5\%\} \times \left(\frac{\$100\text{M}}{80\text{M}}\right) \approx -\$0.01/\text{sh}$$

Doesn't matter whether 5% is earnings cost of equity or debt. Either way, math is same. CEO won't invest.

Summary of real-investment calculations
(External financing only)

Cost = \$100M; $\mathbb{E}[\Delta\mathrm{NOI}]$ = \$4M; IY = 4%

		Value Stock	Growth Stock
Is accretive?		No	Yes
Earnings yield	EY	5%	2%
Mrgnl int rate	i	5%	3%
Hurdle rate	$\mathrm{HR} = \min\{\mathrm{EY}, \mathrm{i}\}$	5%	2%
Cheaper to use equity or debt?		Same	Equity
Funding cost	$\mathrm{HR} \times \mathrm{Cost}$	\$5M	\$2M
Income gain/loss	$\mathbb{E}[\Delta\mathrm{NOI}] - \mathrm{HR} \times \mathrm{Cost}$	-\$1M	+\$2M
Yield spread	$\{\mathrm{IY} - \mathrm{HR}\}$	-1%	+2%
$\Delta\mathbb{E}[\mathrm{EPS}]$	$\{\mathrm{IY} - \mathrm{HR}\} \times \left(\frac{\mathrm{Cost}}{\#\mathrm{Shares}}\right)$	-\$0.01/sh	+\$0.01/sh

Riskfree interest income from cash windfall

So far we have assumed that companies must rely on external financing. In practice, many CEOs fund investment out of internal cash reserves.

Suppose CEO gets unexpected \$100M cash windfall. If she doesn't use money to fund project, can collect $3\% \times \$100\text{M} = \$3\text{M}$ next year by lending cash to US government. i.e., by holding Treasuries.

Under this approach, value stock has EPS forecast of

$$\underset{\substack{\text{Value stock}\\ \text{Lend cash}}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M} + \$3\text{M}}{80\text{M}} \approx \$5.04/\text{sh}$$

$$3\% \times \left(\tfrac{\$100\text{M}}{80\text{M}}\right) \approx +\$0.04/\text{sh}$$

Growth stock's EPS forecast when lending cash is

$$\underset{\substack{\text{Growth stock}\\ \text{Lend cash}}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M} + \$3\text{M}}{200\text{M}} = \$2.015/\text{sh}$$

$$3\% \times \left(\tfrac{\$100\text{M}}{200\text{M}}\right) = +\$0.015/\text{sh}$$

Unused cash is like negative debt

Investing cash in Treasuries and paying down riskfree debt are mirror-image transactions.

Lending \$1 of cash to Uncle Sam allows a company to collect rf $\times$ \$1 in riskfree interest income next year.

Borrowing \$1 riskfree incurs interest expense of rf $\times$ \$1.

A CEO will only spend cash on something else (e.g., a project) if that other thing is more accretive than collecting riskfree interest income.

Value stock funds project with cash

Value-stock CEO can collect $3\% \times \$100\text{M} = \$3\text{M}$ of risk-free interest income by investing cash in Treasuries

$$\underset{\substack{\text{Value stock}\\\text{No cash}}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M}}{80\text{M}} = \$5.00/\text{sh}$$

$$\underset{\substack{\text{Value stock}\\\text{Lend cash}}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M} + \$3\text{M}}{80\text{M}} \approx \$5.04/\text{sh}$$

$$3\% \times \left(\tfrac{\$100\text{M}}{80\text{M}}\right) \approx +\$0.04/\text{sh}$$

But, by using \$100M cash to fund project, value-stock CEO can add $\mathbb{E}[\Delta\text{NOI}_1] = \$4\text{M}$ next year

$$\underset{\substack{\text{Value stock}\\\text{Fund w cash}}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M} + \$4\text{M}}{80\text{M}} = \$5.05/\text{sh}$$

$$4\% \times \left(\tfrac{\$100\text{M}}{80\text{M}}\right) = +\$0.05/\text{sh}$$

Since $\$4\text{M} > \$3\text{M}$, spending cash on project funding boosts the value stock's EPS forecast by an extra

$$\{4\% - 3\%\} \times \left(\tfrac{\$100\text{M}}{80\text{M}}\right) \approx +\$0.01/\text{sh}$$

Cash windfall lowers value stock's hurdle

Value stock financed its existing assets by levering up until $EY_\star = i_\star = 5\%$. So it costs $5\% \times \$100M = \$5M$ to raise \$100M of external capital. That made investing dilutive. Project only added \$4M in income.

Cash windfall changed the value stock's investment decision. With \$100M in cash reserves that would otherwise be saved in Treasuries, it only costs $3\% \times \$100M = \$3M$ to fund the project. On those terms, it's accretive to fund the project and collect an extra \$4M next year.

When a firm has internal cash reserves, the relevant hurdle rate calculation is

$$HR = \min\left\{ \underset{\substack{\text{Issue} \\ \text{equity}}}{EY}, \underset{\substack{\text{Sell} \\ \text{bonds}}}{i}, \underset{\substack{\text{Spend} \\ \text{cash}}}{rf} \right\}$$

Growth stock doesn't spend cash on projects

Growth-stock CEO can collect $3\% \times \$100\text{M} = \$3\text{M}$ of riskfree interest income by investing cash in Treasuries

$$\underset{\substack{\text{Growth stock}\\ \text{Lend cash}}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M} + \$3\text{M}}{200\text{M}} = \$2.015/\text{sh}$$

$$3\% \times \left(\tfrac{\$100\text{M}}{200\text{M}}\right) = +\$0.015/\text{sh}$$

If growth stock uses cash to fund project, then EPS forecast rises to

$$\underset{\substack{\text{Growth stock}\\ \text{Fund w cash}}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M} + \$4\text{M}}{200\text{M}} = \$2.02/\text{sh}$$

$$4\% \times \left(\tfrac{\$100\text{M}}{200\text{M}}\right) = +\$0.02/\text{sh}$$

But growth stock has better option! By issuing $\frac{\$100\text{M}}{\$100/\text{sh}} =$ +1M shares, CEO can get \$4M from project AND collect \$3M from lending cash to Uncle Sam

$$\underset{\substack{\text{Growth stock}\\ \text{Lend cash}\\ \text{Fund w eqty}}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M}+\$4\text{M}+\$3\text{M}}{200\text{M} + 1\text{M}} \approx \$2.025/\text{sh}$$

$$\{[4\% - 2\%] + 3\%\} \times \left(\tfrac{\$100\text{M}}{200\text{M}}\right) = +\$0.025/\text{sh}$$

Cash doesn't alter growth stock's hurdle

Cash is like negative riskfree debt. And, before cash appeared, growth-stock CEO already saw equity financing as cheaper, $\text{EY}_0 = 2\% < \text{i}_0 = \text{rf} = 3\%$. So growth stock's original hurdle rate didn't change

$$\underset{\text{HR}}{2\%} = \overbrace{\min\{\underset{\text{EY}}{2\%}, \underset{\text{i}}{3\%}\}}^{\text{no cash}} = \overbrace{\min\{\underset{\text{EY}}{2\%}, \underset{\text{i}}{3\%}, \underset{\text{rf}}{3\%}\}}^{\text{with cash}}$$

Growth stock would fund \$100M project that generates $\mathbb{E}[\Delta\text{NOI}_1] = \$4\text{M}$ next year with cash if that was the only option, $\text{IY} = 4\% > \text{rf} = 3\%$. But it'd be even more accretive to finance upfront cost at $\text{EY}_0 = 2\%$.

On top of this, issuing shares has another added benefit. The growth stock gets to continue collecting riskfree interest income by lending cash to US government.

External financing vs. organic growth

For the value stock, external capital markets are much more expensive than organic growth funded out of internal cash reserves

$$\underbrace{\text{EY}_\star = \text{i}_\star = 5\%}_{\text{External financing}} \quad > \quad \underbrace{\text{rf} = 3\%}_{\text{Organic growth}}$$

Raising \$1 of external capital costs $\{5\% - 3\%\} \times \$1 =$ +\$0.02 more than spending \$1 of cash. Gap is so large because value stock added +\$1.00/sh to its EPS forecast by levering up when financing its existing assets.

For growth stock, it makes sense to lump debt and cash together. Equity financing is outlier

$$\underbrace{\text{EY}_0 = 2\%}_{\text{Equity}} \quad < \quad \underbrace{\text{i}_0 = \text{rf} = 3\%}_{\text{Net cash}}$$

Growth stocks with legacy debt often talk about “net cash” positions. This makes sense given that next \$1 borrowed and next \$1 cash spent both cost same.

What an investment rule must do

If CEO pays \$100M cost today, then her firm's net operating income will rise by +\$4M each year going forward

$$\text{Project benefits} = \left\{ \underset{\mathbb{E}[\Delta\text{NOI}_1]}{+\$4\text{M}}, \underset{\mathbb{E}[\Delta\text{NOI}_2]}{+\$4\text{M}}, \underset{\mathbb{E}[\Delta\text{NOI}_3]}{+\$4\text{M}}, \ldots \right\}$$

To make investment decision, CEO must compare flow of benefits to up-front cost and pick which is better.

Investment rule says how to make comparison.

There are two options:

- Convert upfront cost into equivalent payment flow
- Convert benefit flow into equivalent present value

EPS maximizers convert up-front cost into equivalent annual expense flow

EPS maximizers take first approach. max EPS investment rule compares project's expected income next year to financing expense that must be paid next year

$$\underbrace{\overset{\$4\text{M}}{\mathbb{E}[\Delta \text{NOI}_1]}}_{\substack{\text{Income gain}\\\text{next year}}} \quad \text{vs.} \quad \underbrace{\overset{\$100\text{M}}{\text{HR} \times \text{Cost}}}_{\substack{\text{Financing}\\\text{expense}}}$$

Ignore long-term benefits AND long-term costs.

Consistently short-termist.

Hurdle rate converts up-front cost into annual financing expense. Project is accretive if each $1 spent adds more income next year than needed to finance $1

$$\underbrace{\{\text{IY} - \text{HR}\} > 0\%\text{pt}}_{\text{max EPS investment criterion}} \quad \rightsquigarrow \quad \underbrace{\text{IY} \times \$1}_{\substack{\text{Income gain}\\\text{next year}}} > \underbrace{\text{HR} \times \$1}_{\substack{\text{Financing}\\\text{expense}}}$$

Textbooks say to convert flow of future benefits into equivalent present value

Present value of project's expected future income stream from year $t = 1$ onward is given by

$$\mathbb{PV}_{\mathrm{r}}\left[\begin{smallmatrix}\text{Project}\\ \text{benefits}\end{smallmatrix}\right] = \sum_{t=1}^{\infty} \frac{\mathbb{E}[\Delta \mathrm{NOI}_t]}{(1+\mathrm{r})^t}$$

r is risk-adjusted discount rate.

"Positive-NPV rule" (net present value) says to invest in projects where present value of project benefits exceeds upfront cost when using risk-adjusted discount rate

$$\mathbb{PV}_{\mathrm{r}}\left[\begin{smallmatrix}\text{Project}\\ \text{benefits}\end{smallmatrix}\right] - \text{Cost} > \$0$$

♠★ IMPORTANT ★♣

Must choose risk-adjusted discount rate r before computing $\mathbb{PV}_{\mathrm{r}}\left[\begin{smallmatrix}\text{Project}\\ \text{benefits}\end{smallmatrix}\right]$.

Present-value logic puts emphasis on choosing exact risk-adjusted r

Project will boost income by \$4M each year in perpetuity, so present value of future benefits is

$$\mathbb{PV}_r\left[\begin{smallmatrix}\text{Project}\\\text{benefits}\end{smallmatrix}\right] = \frac{\$4M}{1+r} + \frac{\$4M}{(1+r)^2} + \frac{\$4M}{(1+r)^3} + \cdots$$
$$= \$4M \times \left(\frac{1}{r}\right)$$

Is \$100M project positive NPV or negative NPV?

Tiny changes in discount rate can flip answer

Discount rate, r	Multiple (1/r)	Present value	NPV
3.0%	33.3×	\$133M	+\$33M
3.5%	28.6×	\$114M	+\$14M
4.0%	25.0×	\$100M	\$0M
4.5%	22.2×	\$89M	-\$11M
5.0%	20.0×	\$80M	-\$20M
5.5%	18.2×	\$73M	-\$27M
6.0%	16.7×	\$67M	-\$33M

If r = 3.5%, then project creates +\$14M of value.

If r = 4.5%, then project erases −\$11M of value.

Accretive over-investment

We've already seen that maximizing EPS does not require zero investment. We now show that EPS maximization can easily lead to overinvestment.

Project expected to generate \$4M of net operating income each year in perpetuity. If "correct" risk-adjusted discount rate is r = 4.5%, then project is negative NPV

$$\overbrace{\$4\text{M} \times \left(\tfrac{1}{4.5\%}\right)}^{\$89\text{M}} - \$100\text{M} = -\$11\text{M}$$

EPS-maximizing CEO of $EY_0 = 2\%$ growth stock happily invested in this project

$$\$4\text{M} - 2\% \times \$100\text{M} = +\$2\text{M}$$

By funding project with equity, CEO can collect \$4M of income next year at an earnings cost of just \$2M.

Specific choice of 1Y horizon not what distinguishes max EPS from PV logic

EPS maximizers weight short-term costs and benefits when making investment decisions. Our simple model focuses on 1Y horizon, but some CEOs set 2Y, 3Y, or 5Y targets. Exact definition of "short-term" isn't critical.

EPS maximizers at 1Y and 2Y horizon both ignore all benefits from year $t = 3$ onward

$$\begin{aligned}
\mathbb{PV}_{\mathrm{r}}\left[\begin{smallmatrix}\text{Project}\\\text{benefits}\end{smallmatrix}\right] &= \overbrace{\frac{\$4\mathrm{M}}{1+\mathrm{r}} + \frac{\$4\mathrm{M}}{(1+\mathrm{r})^2}}^{\substack{\text{Whether CEO counts}\\\text{one or both of these}}} + \overbrace{\frac{\$4\mathrm{M}}{(1+\mathrm{r})^3} + \cdots}^{\substack{\text{...she ignores } \infty\\\text{terms after that!}}} \\
&= \frac{\$4\mathrm{M}}{1+\mathrm{r}} + \frac{\$4\mathrm{M}}{(1+\mathrm{r})^2} + \frac{\left\{\frac{\$4\mathrm{M}}{1+\mathrm{r}} + \frac{\$4\mathrm{M}}{(1+\mathrm{r})^2} + \cdots\right\}}{(1+\mathrm{r})^2} \\
&= \frac{\$4\mathrm{M}}{1+\mathrm{r}} + \frac{\$4\mathrm{M}}{(1+\mathrm{r})^2} + \frac{\mathbb{PV}_{\mathrm{r}}\left[\begin{smallmatrix}\text{Project}\\\text{benefits}\end{smallmatrix}\right]}{(1+\mathrm{r})^2}
\end{aligned}$$

When $\mathrm{r} = 4\%$, project benefits are worth $\$4\mathrm{M} \times \left(\frac{1}{4\%}\right) = \$100\mathrm{M}$. Majority of present value comes from terms 1Y and 2Y EPS maximizers both ignore, $\frac{\$100\mathrm{M}}{(1+4\%)^2} = \$92.5\mathrm{M}$.

IRR is multi-year generalization of IY

Internal rate of return (IRR) equates present value of benefit flow with project's upfront cost

$$\text{IRR} \;=\; \left\{\, \text{r} > 0\% \;:\; \mathbb{PV}_{\text{r}}\left[\begin{smallmatrix}\text{Project}\\ \text{benefits}\end{smallmatrix}\right] = \text{Cost} \,\right\}$$

IRR is yield implied by project's upfront price tag, not risk-adj discount rate used to compute price.

Consider 2-year FV = \$100M coupon bond with c = 4% coupon rate. This bond's IRR is called "yield to maturity"

$$\text{Price} \;=\; \frac{\$4\text{M}}{1+\text{y}} + \frac{\$4\text{M}}{(1+\text{y})^2} + \frac{\$100\text{M}}{(1+\text{y})^2}$$

Bond's coupon rate is income yield, IY = $\frac{\$4\text{M}}{\$100\text{M}}$ = 4%. When priced at par, Price = \$100M, we get y = c = 4%.

IRR fits neatly into max EPS paradigm. Puts emphasis on short-term cash flows. If bond is priced at par, Price = FV = \$100M, then its yield must equal its coupon rate, y = c. Only free parameter is size of coupon payments.

Payback period is IY expressed as a multiple

A project's expected payback period is defined as

$$\mathbb{E}[\text{Payback Period}] = \frac{\text{Cost}}{\mathbb{E}[\Delta \text{NOI}_1]} = \left(\frac{1}{\text{IY}}\right)$$

It takes $\left(\frac{1}{4\%}\right) = 25$ years for project that generates \$4M a year in income to repay \$100M up-front cost.

Growth stock has EY = 2%. To issue \$1 of equity, CEO must promise $2\% \times \$1 = \$0.02$ of expected earnings next year. If CEO promises \$1 of expected earnings next year, equity markets will provide $\$1 \times \left(\frac{1}{2\%}\right) = \$50$ today.

Project has $\text{IY} = 4\%$. Each \$1 spent on project adds $4\% \times \$1 = \$0.04$ to income next year. If CEO spends $\$1 \times \left(\frac{1}{4\%}\right) = \$25$ today, her income rises by \$1 next year.

In M&A deals, EPS maximizers like acquiring the target company at a low PE. When discussing internal projects, EPS maximizers quote a payback period instead.

Alternative metrics hard to square with NPV

CEOs surveyed in Graham and Harvey (2001) reported using IRR more often than NPV. Both involve present-value formula, but very different economics!

Positive-NPV rule says to first choose r based on the project's risk profile, then use this value to compute $\mathbb{PV}_r\left[\substack{\text{Project}\\\text{benefits}}\right]$. Invest if result is larger than up-front cost.

IRR method first assumes project is zero NPV, then chooses yield based on this requirement.

Welch (2008) calls payback period "a stupid idea." Ross, Westerfield, and Jordan (2009) says it "doesn't ask the right question. Payback period reflects how long to break even in accounting sense, but not economic sense."

But accounting sense is what matters to EPS max'er!

What if project has no short-term income?

Suppose project doesn't generate any income in year $t = 1$. Then, from year $t \geq 2$ onward, project produces same +\$4M income boost as before.

Delaying first \$4M payout by twelve months changes the project's income yield

$$\underset{\text{Orig}}{\text{IY}} = \frac{\$4\text{M}}{\$100\text{M}} = 4\% \quad \rightsquigarrow \quad \underset{\text{Delay}}{\text{IY}} = \frac{\$0}{\$100\text{M}} = 0\%$$

In our simple model, CEO would never invest in project that added \$0 income next year. In practice, companies do sometimes invest in such projects.

There's no contradiction here. EPS-maximizing CEOs invest in projects that produce little-to-no income in the short-term by taking advantage of accounting regulations that were specifically designed for this purpose.

e.g., capitalized interest

How capitalizing interest expense makes investing in long-term projects accretive

Consider \$100M project that doesn't become operational until year $t = 2$. Project generates \$0 income next year, but it yields +\$4M every year after that

$$\begin{matrix}\text{Project}\\ \text{benefits}\end{matrix} = \left\{ \underset{\mathbb{E}[\Delta\text{NOI}_1]}{\$0\text{M}}, \underset{\mathbb{E}[\Delta\text{NOI}_2]}{+\$4\text{M}}, \underset{\mathbb{E}[\Delta\text{NOI}_3]}{+\$4\text{M}}, \ldots \right\}$$

If CEO funds project by borrowing \$100M at rf = 3%, then next year she'll have to make $3\% \times \$100\text{M} = \$3\text{M}$ interest payment. If interest payment gets deducted from earnings forecast, then project would be dilutive.

But, since project isn't yet operational, CEO can capitalize first \$3M interest expense into project's \$100M cost, giving project income yield of

$$\underset{\text{Caplz}}{\text{IY}} = \frac{\$4\text{M}}{\$100\text{M} + \$3\text{M}} = 3.9\%$$

This is lower than original project, $\frac{\$4\text{M}}{\$100\text{M}} = 4\%$, but high enough to make investing accretive when rf = 3%.

Cross-sectional predictions

	Growth EY < rf	**Value** EY > rf
Prefers to fund projects with:	Equity	Cash
Investment cash-flow sensitivity?	Low	High
Most of debt tends to be:	Exotic	Vanilla

Growth ($EY < rf$): Low EY implies equity is cheapest funding option, even when cash is present. Only makes sense to issue debt to take advantage of specific accounting exemptions (e.g., capitalized interest).

Value ($EY > rf$): Existing assets are highly levered, $\ell_\star \gg 0$. Each \$1 of external financing has earnings cost $HR = EY(\ell_\star) = i(\ell_\star)$. Hurdle rate would drop to $HR = rf$ following cash windfall. Excess $EY = EY - rf$ measures how much more expensive external project-funding is.

Part III

Payout policy

Defining the "payout policy" problem

We study EPS-maximizing CEOs of same two companies: value stock with unlevered $EY_0 = 4\%$ and growth stock with unlevered $EY_0 = 2\%$. Riskfree rate is $rf = 3\%$. Both firms trade at Price = \$100/sh and have Assets = \$20B.

Both CEOs have optimized their capital structure. Growth stock went all equity, issuing $\frac{\$20B}{\$100/sh} = 200M$ shares. Value stock levered up until $EY_\star = i_\star = 5\%$, borrowing \$12B and only issuing $\frac{\$8B}{\$100/sh} = 80M$ shares.

Right after making these choices, each company gets unexpected \$200M cash windfall. This is enough to fund \$100M project from previous section and then some.

Should CEO retain \$200M cash windfall? This would allow her to generate extra income next year by investing money. Or would it be more accretive to return \$200M to shareholders? If so, how best to distribute?

Opportunity cost of cash retention

Both CEOs can spend \$200M windfall on buybacks, shrinking float by $\frac{\$200\text{M}}{\$100/\text{sh}} = 2\text{M}$ shares.

Value stock has $\text{EY}_\star = 5\%$, so cash-financed buybacks would boost EPS forecast by $5\% \times \left(\frac{\$200\text{M}}{80\text{M}}\right) = +\$0.125/\text{sh}$

$$\underset{\substack{\text{Value stock}\\ \text{No cash}}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M}}{80\text{M}} = \$5.00/\text{sh}$$

$$\underset{\substack{\text{Value stock}\\ \text{Buybacks}}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M}}{80\text{M} - 2\text{M}} = \$5.125/\text{sh}$$

Growth stock has $\text{EY}_0 = 2\%$, so cash-financed buybacks would be less accretive, $2\% \times \left(\frac{\$200\text{M}}{200\text{M}}\right) = +\$0.02/\text{sh}$

$$\underset{\substack{\text{Growth stock}\\ \text{No cash}}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M}}{200\text{M}} = \$2.00/\text{sh}$$

$$\underset{\substack{\text{Growth stock}\\ \text{Buybacks}}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M}}{200\text{M} - 2\text{M}} = \$2.02/\text{sh}$$

♣★ Opportunity cost of cash retention ★♠
By retaining windfall and investing money,
CEO gives up accretive pop from buybacks.

High EY makes cash expensive to retain

Value-stock CEO faces $\text{EY}_\star = 5\%$ earnings cost of equity. To justify retaining cash windfall, she needs to get even higher yield by investing money.

Letting the money sit in Treasuries ain't going to cut it. Value stock can save $5\% \times \$200\text{M} = \$10\text{M}$ next year by using cash windfall to buy back shares. Lending money to Uncle Sam at $\text{rf} = 3\%$ only yields $3\% \times \$200\text{M} = \$6\text{M}$.

Riskfree interest income would only add $3\% \times \left(\frac{\$200\text{M}}{80\text{M}}\right) \approx +\$0.08/\text{sh}$ to value stock's EPS forecast

$$\underset{\substack{\text{Value stock}\\ \text{Lend cash}}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M} + \$6\text{M}}{80\text{M}} \approx \$5.08/\text{sh}$$

$$\underset{\substack{\text{Value stock}\\ \text{Buybacks}}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M}}{80\text{M} - 2\text{M}} = \$5.125/\text{sh}$$

Better to buy back shares, $5\% \times \left(\frac{\$200\text{M}}{80\text{M}}\right) = +\$0.125/\text{sh}$

Using cash to fund organic growth

How does CEO boost income yield on \$200M cash windfall? By allocating money toward higher-yield projects.

Suppose company can use cash to fund two projects

$$\begin{matrix}\text{Investment} \\ \text{opportunities}\end{matrix} = \left\{ \begin{pmatrix} \mathbb{E}[\Delta\text{NOI}] : \$4\text{M} \\ \text{Cost} : \ \$100\text{M} \end{pmatrix}, \begin{pmatrix} \mathbb{E}[\Delta\text{NOI}] : \$5\text{M} \\ \text{Cost} : \ \$50\text{M} \end{pmatrix} \right\}$$

First project is IY = 4% idea we studied in last section. Second project costs less but has higher yield, IY = 10%. Average income yield is

$$\overline{\text{IY}} = \frac{\$4\text{M} + \$5\text{M}}{\$100\text{M} + \$50\text{M}} = 6\%$$

Funding both projects would cost \$100M + \$50M = \$150M. So company has maximum cash usage rate of

$$\theta = \frac{\$100\text{M} + \$50\text{M}}{\$200\text{M}} = 75\%$$

Blended cash yield

By allocating \$150M toward high-yield projects, value-stock CEO adds \$4M + \$5M = \$9M to income next year. Lending \$50M to US government generates 3%×\$50M = \$1.5M in riskfree interest income. Blended cash yield is

$$\mathrm{CY} = \frac{\$9\mathrm{M} + \$1.5\mathrm{M}}{\$200\mathrm{M}} = 5.25\%$$

CEO gets yield of $\overline{\mathrm{IY}} = 6\%$ on 75% of cash windfall and rf = 3% on remaining 25%

$$\mathrm{CY} = \underbrace{\theta \times \overline{\mathrm{IY}}}_{0.75 \times 6\%} + \underbrace{(1 - \theta) \times \mathrm{rf}}_{0.25 \times 3\%} = 5.25\%$$

Value-stock CEO collects “organic-growth premium” by using cash to fund high-yield projects

$$\Delta\mathrm{CY} = \underset{5.25\%}{\mathrm{CY}} - \underset{3\%}{\mathrm{rf}} = \overbrace{\theta \times \{\overline{\mathrm{IY}} - \mathrm{rf}\}}^{0.75 \times \{6\% - 3\%\}} = 2.25\%$$

It can be accretive for value stocks to retain cash

By using cash windfall to buy back $\frac{\$200\text{M}}{\$100/\text{sh}} = 2\text{M}$ shares, value stock with $\text{EY}_\star = 5\%$ can shave $5\% \times \$200\text{M} = \$10\text{M}$ off its earnings cost of financing

$$\underset{\substack{\text{Value stock}\\\text{Buybacks}}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M}}{80\text{M} - 2\text{M}} = \$5.125/\text{sh}$$

$$5\% \times \left(\tfrac{\$200\text{M}}{80\text{M}}\right) = +\$0.125/\text{sh}$$

But, by using \$150M cash to fund projects and packing the remaining \$50M in Treasuries, value stock can add $\$9\text{M} + \$1.5\text{M} = \$10.5\text{M}$ in income next year

$$\underset{\substack{\text{Value stock}\\\text{Fund w cash}}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M} + \$9\text{M} + \$1.5\text{M}}{80\text{M}} \approx \$5.13/\text{sh}$$

$$5.25\% \times \left(\tfrac{\$200\text{M}}{80\text{M}}\right) \approx +\$0.130/\text{sh}$$

Since $\$10.5\text{M} > \$10\text{M}$, it's accretive for value stock to retain cash. With blended cash yield of $\text{CY} = 5.25\%$, retention delivers an extra

$$\{5.25\% - 5\%\} \times \left(\tfrac{\$200\text{M}}{80\text{M}}\right) \approx +\$0.005/\text{sh}$$

A high EY makes it cheap to spend cash

Without cash windfall, value-stock CEO wouldn't fund \$100M project with IY = 4%, losing out on \$1M of income next year as a result

$$\text{Cash @ 3\%} \quad \rightsquigarrow \quad \{4\% - 3\%\} \times \$100\text{M} = +\$1\text{M}$$

Value-stock CEO would still fund \$50M project without cash, but higher financing expense would reduce net income gain by \$1M next year

$$\begin{aligned} \text{Equity/debt @ 5\%} &\rightsquigarrow \{10\% - 5\%\} \times \$50\text{M} = +\$2.5\text{M} \\ \text{Cash @ 3\%} &\rightsquigarrow \{10\% - 3\%\} \times \$50\text{M} = +\$3.5\text{M} \end{aligned}$$

Not having cash would reduce value stock's earnings by −\$2M next year: −\$1M from not funding \$100M project and −\$1M from funding \$50M project on worse terms.

Increasing EY makes spending cash even cheaper

Suppose value stock's external cost of capital increased from $EY_\star = i_\star = 5\%$ to 6%.

Facing even higher cost, CEO wouldn't fund \$100M project with IY = 4% in absence of internal cash reserves, losing out on \$1M of income next year

$$\text{Cash @ 3\%} \quad \rightsquigarrow \quad \{4\% - 3\%\} \times \$100\text{M} = +\$1\text{M}$$

Funding the \$50M project with IY = 10% would now be even more expensive in absence of cash

$$\begin{aligned} \text{Equity/debt @ 6\%} &\rightsquigarrow \{10\% - 6\%\} \times \$50\text{M} = +\$2.0\text{M} \\ \text{Cash @ 3\%} &\rightsquigarrow \{10\% - 3\%\} \times \$50\text{M} = +\$3.5\text{M} \end{aligned}$$

With 6% external financing, not having cash would lower value stock's earnings by −\$2.5M next year: −\$1M from not funding \$100M project and −\$1.5M from financing \$50M project on even worse terms.

Increasing EY also raises opportunity cost of keeping cash on balance sheet

Increase from $EY_\star = i_\star = 5\%$ to 6% means that, if value-stock CEO didn't retain cash, she'd have to pay \$500k more next year to fund \$50M project

$$\{6\% - 5\%\} \times \$50\text{M} \;=\; \$500\text{k}$$

Same +1%pt increase in $EY_\star$ means that value-stock CEO would be giving up extra \$2M by not using cash windfall to repurchase shares

$$\{6\% - 5\%\} \times \$200\text{M} \;=\; \$2\text{M}$$

♠★ Key Insight ★♣

Companies that get most benefit from funding projects with cash are most likely to return cash to shareholders.

A low EY makes it expensive to spend cash

Growth-stock CEO can raise equity capital at $EY_0 = 2\%$ earnings cost. Funds both projects by issuing equity.

For \$100M project with IY = 4%, equity financing lowers earnings cost by \$1M next year

$$\text{Equity @ 2\%} \rightsquigarrow \{4\% - 2\%\} \times \$100\text{M} = +\$2\text{M}$$
$$\text{Cash @ 3\%} \rightsquigarrow \{4\% - 3\%\} \times \$100\text{M} = +\$1\text{M}$$

For \$50M project with IY = 10%, equity financing reduces short-term funding cost by \$500k

$$\text{Equity @ 2\%} \rightsquigarrow \{10\% - 2\%\} \times \$50\text{M} = +\$4\text{M}$$
$$\text{Cash @ 3\%} \rightsquigarrow \{10\% - 3\%\} \times \$50\text{M} = +\$3.5\text{M}$$

♠★ Key Insight ★♣

Growth stock's most accretive use for cash is lending money to US government and collecting riskfree interest income. Fund higher-yield projects with equity.

It's accretive for growth stock to retain cash and invest money in Treasuries

Growth stock funds projects by issuing equity. So, for cash retention to be optimal, riskfree interest income must exceed cost savings from buybacks. And it does!

Growth stock can use \$200M cash windfall to buy back $\frac{\$200\text{M}}{\$100/\text{sh}} = 2\text{M}$ shares. With $\text{EY}_0 = 2\%$, would reduce financing expense by $2\% \times \$200\text{M} = \$2\text{M}$ next year

$$\underset{\substack{\text{Growth stock}\\ \text{Buybacks}}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M}}{200\text{M} - 2\text{M}} = \$2.02/\text{sh}$$

$$2\% \times \left(\tfrac{\$200\text{M}}{200\text{M}}\right) = +\$0.02/\text{sh}$$

Lending \$200M cash windfall to US government at $\text{rf} = 3\%$ generates $3\% \times \$200\text{M} = \$6\text{M}$ next year

$$\underset{\substack{\text{Growth stock}\\ \text{Lend cash}}}{\mathbb{E}[\text{EPS}]} = \frac{\$400\text{M} + \$6\text{M}}{200\text{M}} \approx \$2.03/\text{sh}$$

$$3\% \times \left(\tfrac{\$200\text{M}}{200\text{M}}\right) = +\$0.03/\text{sh}$$

Consistent application of max EPS logic

Capital Structure. Value-stock CEO levered up until $EY_\star = i_\star = 5\%$. Equity markets offered growth-stock CEO better terms, $EY_0 = 2\%$, so she remained unlevered.

Real Investment. Value-stock CEO sees spending cash as cheap, $HR = \min\{\overset{5\%}{EY_\star}, \overset{5\%}{i_\star}, \overset{3\%}{rf}\} = 3\%$, so would like to raise cash yield by spending money on projects

$$CY = \begin{cases} rf + \theta \times \{\overline{IY} - rf\} & \text{value stock} \\ rf & \text{growth stock} \end{cases}$$

Growth stock sees equity as cheaper, $\min\{\overset{2\%}{EY_0}, \overset{3\%}{i_0}, \overset{3\%}{rf}\} = 2\%$. Would invest cash windfall in Treasuries.

Payout Policy. Accretive to retain \$200M windfall if

$$\underset{\text{Invest cash}}{\mathbb{E}[EPS]} - \underset{\text{Buybacks}}{\mathbb{E}[EPS]} = \{CY - EY\} \times \left(\frac{\$200M}{\#Shares} \right) > \$0/sh$$

Growth stock ($EY < rf$) retains even though $CY = rf$. Value stock ($EY > rf$) must justify retention by spending enough cash on high-yield projects, $\Delta CY > EY - rf$.

Textbooks assume shareholder value must reflect present-value principles

Shareholders could value stake by discounting future cash flows they expect to receive by owning share

$$
\begin{aligned}
\mathbb{PV}_{\mathrm{r}}\left[\begin{smallmatrix}\text{Shareholder}\\ \text{cash flows}\end{smallmatrix}\right] &= \frac{\mathbb{E}[\mathrm{CF}_1]}{1+\mathrm{r}} + \frac{\mathbb{E}[\mathrm{Price}_1]}{1+\mathrm{r}} \\
&= \frac{\mathbb{E}[\mathrm{CF}_1]}{1+\mathrm{r}} + \sum_{t=2}^{\infty} \frac{\mathbb{E}[\mathrm{CF}_t]}{(1+\mathrm{r})^t} \\
&= \mathbb{E}[\mathrm{CF}_1] \times \left(\frac{1}{\mathrm{r}-\mathrm{g}}\right)
\end{aligned}
$$

r is risk-adj discount rate

g is long-run growth rate

Present-value logic puts emphasis on long-term payouts in dotted box. S&P 500 dividend yield is 2%. Would imply that 98% of present value delivered from $t \geq 2$.

Present-value logic says r is property of expected future cash flows. If corporate policy alters this stream of payouts, r should immediately update to reflect change.

Why M&M dividend irrelevance breaks

If CEOs aren't maximizing some version of shareholder PV, then there's no reason to expect Modigliani and Miller (1961)'s dividend-irrelevance theorem to hold.

Present-value framework stacks the deck against payout timing. Money distributed today can't be distributed next year. So choice of objective function guarantees that increase in today's dividend, $\mathbb{E}[\text{Div}_1]$, will always be offset by decline in resale price next year, $\mathbb{E}[\text{Price}_1]$.

An EPS forecast doesn't contain $\mathbb{E}[\text{Price}_1]$, so payout policy can be accretive even in frictionless world.

Payout policy and real investment are related

In our model, CEO has already decided how best to finance her existing assets when $200M windfall arrives. But she hasn't yet made project-funding decisions.

In Modigliani and Miller (1961), CEO has already committed herself to investment policy before $200M windfall shows up. When money appears, CEO's only option is to distribute cash to shareholders. Their "irrelevance theorem" just says timing of payout doesn't matter.

When you stop and think about it for one second, you realize the result is a bit silly and not very helpful.

♣★ PAYOUT POLICY IS NOT VERY INTERESTING IF CEO CAN'T USE CASH TO FUND INVESTMENTS! ★♠

What if CEO pays cash dividend?

So far, if CEO returned \$200M cash windfall to shareholders, she did so by repurchasing $\frac{\$200\text{M}}{\$100/\text{sh}} = 2\text{M}$ shares

$$\$200\text{M} = \overbrace{\underbrace{\left(\frac{\$200\text{M}}{\#\text{Shares}}\right)}_{\substack{\text{Amount}\\\text{mailed}}} \times \underbrace{\#\text{Shares}}_{\substack{\text{to every}\\\text{shareholder}}}}^{\text{Pay dividend}} = \overbrace{\underbrace{\text{Price}}_{\substack{\text{Amount}\\\text{received}}} \times \underbrace{\left(\frac{\$200\text{M}}{\text{Price}}\right)}_{\substack{\text{by those}\\\text{who sell}}}}^{\text{Buy back shares}}$$

CEO could also pay cash dividend to each shareholder.

Growth stock has 200M shares, so each shareholder would get a check in the mail for

$$\frac{\$200\text{M}}{200\text{M}} = \$1.00/\text{sh}$$

Value stock has 80M shares, so the company's dividend payment to each shareholder would be 2.5× larger

$$\frac{\$200\text{M}}{80\text{M}} = \$2.50/\text{sh}$$

Dividends are designed to be income-neutral

Conditional on a CEO deciding to return cash, shareholders don't care how the money arrives. But dividends and buybacks aren't equivalent on income statement.

Accounting standards have been designed to treat dividends in an income-neutral way. If CEO pays dividend, then EPS forecast would be

$$\underset{\text{Dividend}}{\mathbb{E}[\text{EPS}]} = \frac{\mathbb{E}[\text{NOI}] - \bar{\imath} \times \text{Debt} + 0\% \times \$200\text{M}}{\#\text{Shares} - 0}$$

No income yield from investing cash. No float reduction.

It is as though company never realized $200M cash windfall. Money went directly to shareholders

$$\underset{\text{No cash}}{\mathbb{E}[\text{EPS}]} = \frac{\mathbb{E}[\text{NOI}] - \bar{\imath} \times \text{Debt}}{\#\text{Shares}}$$

Opportunity cost of paying dividends

By setting things up so that paying a dividend is income-neutral, accounting standards have guaranteed that this is never CEO's most accretive option.

Here's how much a CEO loses out on by paying a dividend as opposed to pursuing her most accretive policy

$$\underset{\text{Dividend}}{\Delta\mathbb{E}[\text{EPS}]} \;=\; -\max[\text{EY}, \text{CY}] \times \left(\frac{\$200\text{M}}{\#\text{Shares}}\right) \;<\; \$0/\text{sh}$$

Growth stock has $\text{EY}_0 = 2\%$ and $\text{CY} = \text{rf} = 3\%$. Most accretive option is to lend money to US government. If CEO instead pays dividend, can no longer collect $3\% \times \$200\text{M} = \$6\text{M}$ in riskfree interest income next year.

Value stock has $\text{EY}_\star = 5\%$ and $\text{CY} = 5.25\%$. Most accretive option is to fund projects with cash. If CEO instead pays dividend, can no longer generate $5.25\% \times \$200\text{M} = \$10.5\text{M}$ in extra net operating income next year.

“Dividends are dominated”
more helpful than
“Dividends are irrelevant”

In our model, no CEOs ever choose to pay dividends.

In real world, some CEOs choose to pay dividends for reasons outside our simple model.

Similar in spirit to Modigliani and Miller (1961) but much more helpful! Says where to find dividend payers.

Deep value stocks (EY $\gg$ rf) are unlikely to pay dividends. Get enormous accretive pop from buybacks. Would be very painful to pay dividend in our model. Outside forces have lots of ground to make up.

Dividend payers should be marginal value stocks (EY $\approx$ rf). These companies get less benefit from buybacks and don’t mind relying on external financing for investment in a pinch. Easier to make dividends look appealing.

How EPS maximizers think about shareholder value

We've now characterized which policies are most accretive. CEOs often think of these policies as ways of creating value for shareholders. The two ideas are closely related. But, as we will see, they are not equivalent.

The key lies in how CEOs think about shareholder value.

EPS maximizers take their firm's EY and PE as given when determining the earnings cost of equity capital. Neither responds immediately to policy changes. If same logic applies to equity valuation, then $\Delta\mathbb{E}[\text{EPS}]$ would be main driver

$$\Delta\text{Price} \;=\; \Delta\mathbb{E}[\text{EPS}] \times \text{PE}$$

This is approach used by sell-side analysts and investor-relations teams. See Ben-David and Chinco (2026e).

Growth stock creates value by retaining cash

Growth stock with $\text{EY}_0 = 2\%$ can collect $3\% \times \$200\text{M} =$ \$6M of riskfree interest income by lending cash windfall to Uncle Sam at $\text{rf} = 3\%$.

Shareholders could invest the same \$200M in Treasuries themselves. But then market would value \$6M riskfree interest income at

$$\$6\text{M} \times \left(\tfrac{1}{3\%}\right) = \$200\text{M}$$

No value created. Just get back \$200M they started with.

By keeping cash on balance sheet, growth-stock CEO ensures that markets price \$6M riskfree interest income at firm's $\text{PE} = \left(\tfrac{1}{2\%}\right) = 50\times$

$$\underbrace{\$6\text{M} \times \left(\tfrac{1}{2\%}\right)}_{\text{Market valuation}} = \$300\text{M}$$

Created +\$100M of value without doing anything special. Premium multiple does all the work.

A different kind of catering

Growth-stock CEO doesn't need better investment opportunities than her shareholders. All she did was lend cash to US government. Benefited from market pricing riskfree interest income at premium multiple

$$\left(\tfrac{1}{2\%}\right) = 50\times \;>\; \left(\tfrac{1}{3\%}\right) = 33\times$$

This is catering. Mechanism different from Baker and Wurgler (2004a,b) where firms initiate dividends when market places a premium on dividend-paying stocks.

Their story is about repricing firm's remaining assets after payouts are announced.

Our story is about multiple currently being applied to income from firm's cash. No multiples expansion.

Two mechanisms not mutually exclusive. EPS maximizers take current EY and PE as given. Our results hold whether values are "correct" or behavioral.

Value stock needs projects to create value

Value stock has $EY_\star = 5\%$. If CEO left \$200M cash windfall in Treasuries at rf = 3%, then 3% × \$200M = \$6M in riskfree interest income would get valued at

$$\$6\text{M} \times \left(\tfrac{1}{5\%}\right) = \$120\text{M}$$

Put in \$200M, destroyed −\$80M of value.

By using \$150M to fund projects and only lending \$50M to Uncle Sam, value-stock CEO generates \$10.5M next year. Market values this at

$$\$10.5\text{M} \times \left(\tfrac{1}{5\%}\right) = \$210\text{M}$$

Put in \$200M, created +\$10M of value.

♠★ Key Insight ★♣

Growth stock creates value through premium multiple. Value stock creates value through high-yield projects. Both use same $\Delta\text{Price} = \Delta\mathbb{E}[\text{EPS}] \times \text{PE}$ logic but get there in very different ways.

Buybacks vs. dividends doesn't affect shareholder value

Suppose value stock with $\text{EY}_\star = 5\%$ has no projects ($\theta = 0$). In that case, CEO would destroy value by investing \$200M cash windfall in Treasuries at 3%

$$\{3\% \cdot \$200\text{M}\} \times \left(\tfrac{1}{5\%}\right) = \$120\text{M}$$

Better to return cash. But does it matter how?

If CEO paid $\frac{\$200\text{M}}{80\text{M}} = \$2.50/\text{sh}$ dividend, then shareholder would get share worth \$100 and \$2.50 of cash.

If CEO instead buys back $\frac{\$200\text{M}}{\$100/\text{sh}} = 2\text{M}$ shares, EPS forecast would rise by $5\% \times \left(\frac{\$200\text{M}}{80\text{M}}\right) = +\$0.125/\text{sh}$ and price of each remaining share would rise by

$$\$0.125/\text{sh} \times \left(\tfrac{1}{5\%}\right) = +\$2.50/\text{sh}$$

Same outcome either way.

Equivalence is mechanical

This equivalence has to hold. Change in share price from cash-financed buybacks is

$$\begin{aligned}\underset{\text{Buybacks}}{\Delta\text{Price}} &= \underset{\text{Buybacks}}{\Delta\mathbb{E}[\text{EPS}]} \times \text{PE} \\ &= \left[\text{EY}\cdot\left(\tfrac{\$200\text{M}}{\#\text{Shares}}\right)\right] \times \left(\frac{1}{\text{EY}}\right) \\ &= \left(\tfrac{\$200\text{M}}{\#\text{Shares}}\right)\end{aligned}$$

Since $\text{PE} = \left(\frac{1}{\text{EY}}\right)$, price increase from buybacks will always equal size of dividend CEO could have paid.

High-EY company gets bigger accretive pop from buying back shares, but increase in EPS forecast gets priced at lower multiple.

Company with lower EY sees smaller accretive pop from buying back shares, but rise in EPS forecast gets priced at higher multiple.

Accretion can't be reduced to value creation

Two concepts are clearly related. CEOs often describe accretive policies as creating value for shareholders.

This makes sense. Market participants often decompose price into

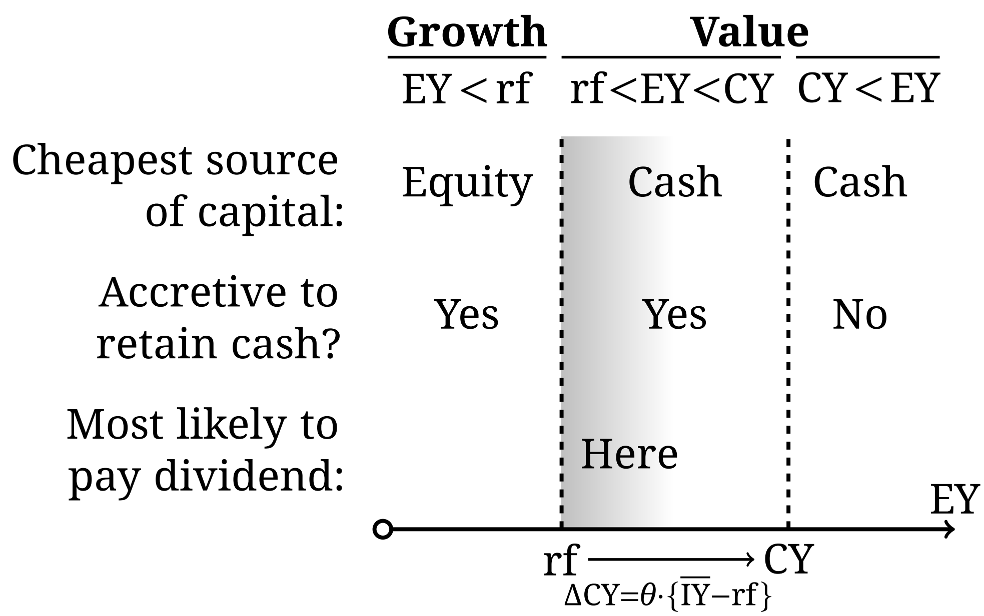
$$\text{Price} = \mathbb{E}[\text{EPS}] \times \text{PE}$$

If PE is stable in short-run, main driver of shareholder value will be short-term EPS growth, $\Delta\mathbb{E}[\text{EPS}] > \$0/\text{sh}$.

But accretion and value creation are different. Analysis of buybacks-vs-dividends decision shows that it's possible for EPS maximizers to care about something which doesn't affect shareholder value.

Popularity of buybacks is evidence that CEOs are pursuing accretion for accretion's sake.

Cross-sectional predictions



Growth (EY $<$ rf): Cash too expensive to spend, but cheap enough to retain. Low EY means it costs less to fund projects by issuing equity, CY = rf, AND makes it accretive to let cash sit in Treasuries, rf $>$ EY.

Value (EY $>$ rf): High EY makes cash cheapest funding option, AND raises opportunity cost of retention. If CEO can't find enough high-yield projects to spend cash on, ΔCY $<$ EY – rf, then more accretive to buy back shares.

Dividends never most accretive policy. Marginal value stocks (EY = rf + ϵ) give up least by going this route.

Part IV

The path ahead

A world of heterogeneous objectives

Are the benefits worth the cost?

- Bond traders apply present-value logic
- CEOs look at net impact on EPS forecast
- Home buyers study recent nearby sales

Present value to rule them all,
present value to find them.
Present value to bring them all,
and in the darkness bind them.

That's Middle Earth, not our reality

Large public companies are run by EPS maximizers

Models of corporate behavior should reflect this fact

Not saying every model should be max EPS model

Bond traders traders don't fixate on EPS growth

Home buyers don't maximize EPS, either

Those models should look different

It is important to understand the economics of accretion and dilution on its own terms

Many CEOs make decisions by looking at how a policy will impact the company's short-term EPS forecast.

These choices are best understood through the economics of accretion and dilution.

Researchers aren't legally required to translate every outcome into present-value language.

EPS maximization isn't simple or shallow. It has a rich internal life of its own!

Look at all the interesting economics we've covered…

Accretive capital structure

Ben-David and Chinco (2026a)

Accretive real investment

Ben-David and Chinco (2026b)

Accretive payout policy

Ben-David and Chinco (2026c)

A question we leave for later

What % of corporate decisions does max EPS explain?

Interesting question.

50%? 75%? 95%?

Definitely not 0%!
Nowhere close.

It's important to understand how companies pursue short-term EPS gains regardless of whether true number turns out to be 50%, 75%, or 95%.

Moreover, to estimate a more precise answer, researchers first need to be able to recognize an accretive policy when they see one.

A question that's already been answered

Can EPS maximization survive in the face of competitive market pressure?

Yes. Reality has run this experiment.

Graham and Dodd were telling readers to avoid dilutive policies back in 1934.

In fact, academics have been trying to convince CEOs to stop fixating on short-term EPS growth since before we were born (see Stern, 1974).

Before worrying about hypothetical world dominated by present-value logic, it's important to acknowledge that EPS maximization is the norm here on earth.

Something we look into elsewhere

Shareholders also obsess over short-term EPS gains and losses. Many see accretive policies as main driver of shareholder value, taking the current multiple as fixed.

Helps explain why max EPS
has persisted for so long.

We find this topic super interesting…

- Ben-David and Chinco (2026e): Analysts value stocks by multiplying EPS forecast times trailing PE.
- Ben-David and Chinco (2026f): Market participants often quote the equity risk premium (ERP) as S&P 500 earnings yield minus 10Y Treasuries, EY – rf.

These notes focus on corporate decision-making. Shareholder's side of things deserves a course of its own.

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