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# Corporate Finance

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# Selecting the Right Investment Projects

## Capital Budgeting Tools

# The Capital Budgeting Process

Generation of investment proposals

Evaluation and selection of these proposals

Approval and control of capital expenditures

Post-completion audit of investment projects

Focus here is on the evaluation and selection of investment proposals

# Methods of Project Evaluation

The major methods used by managers to evaluate projects are:

- Net present value
- Internal rate of return
- Payback period

# Types of Projects

The two broad categories of projects that a firm typically analyzes are

Independent projects

- These are projects that can be evaluated on their own and independently of each other

Mutually exclusive projects

- These are projects where the acceptance of one project rules out the acceptance of other (competing) projects

Which types of projects are easier to evaluate and why?

# What Do Managers Do?

| *Method Used Always or Almost Always* | *Percentage* |
|---|---|
| Internal rate of return | 75.6% |
| Net present value | 74.9% |
| Payback period | 56.7% |
| Accounting rate of return | 20.3% |
| Profitability index | 11.9% |

Source: Graham and Harvey, 2001, "The Theory and Practice of Corporate Finance: Evidence From the Field", Journal of Financial Economics. Based on survey of 392US-based CFOs. The aggregate percentage exceeds 100 percent because most respondents used more than one method of project evaluation. Profitability index = Present value of net cash flows/Initial outlay.

# The Net Present Value Method

The net present value (NPV) method involves.

- Computing the difference between the present value of the net cash flows from an investment and the initial investment outlay

- All cash flows are discounted at the required rate of return which reflects the project's risk

Project's net cash flows

Identify the size and timing of incremental cash flows as a result of the project

Net cash flows after corporate taxes need to be evaluated

Incremental cash flows are the cash flows earned by the firm if the project is undertaken minus cash flows earned by the firm if the project is not undertaken

# The Net Present Value Method

The net present value is computed as

$$NPV = \frac{C_1}{(1+k)} + \frac{C_2}{(1+k)^2} + \ldots + \frac{C_N}{(1+k)^N} - I_0$$

$$NPV = \sum_{t-1}^{N} \frac{C_t}{(1+k)^t} - I_0$$

$I_0$ = Initial investment
$C_t$ = Net after-tax cash flow at the end of year t
k = Project's required rate of return or opportunity cost of capital
N = Economic life of the project in years

Decision: Accept project if NPV 0, reject if NPV < 0

Note: Point of indifference when NPV = 0

# The Net Present Value Method

Example: The net after-tax cash flows from a four-year project that costs $1 million are as follows. Evaluate the project using the net present value method assuming that the project's required rate of return is 12% p.a. How does your decision change if the initial investment were $1,300,000 and not $1,000,000?

| End of Year | Net Cash Flows |
|---|---|
| 0 | -$1,000,000 |
| 1 | $400,000 |
| 2 | $460,000 |
| 3 | $400,000 |
| 4 | $340,000 |

# The Net Present Value Method

The project's net present value is:

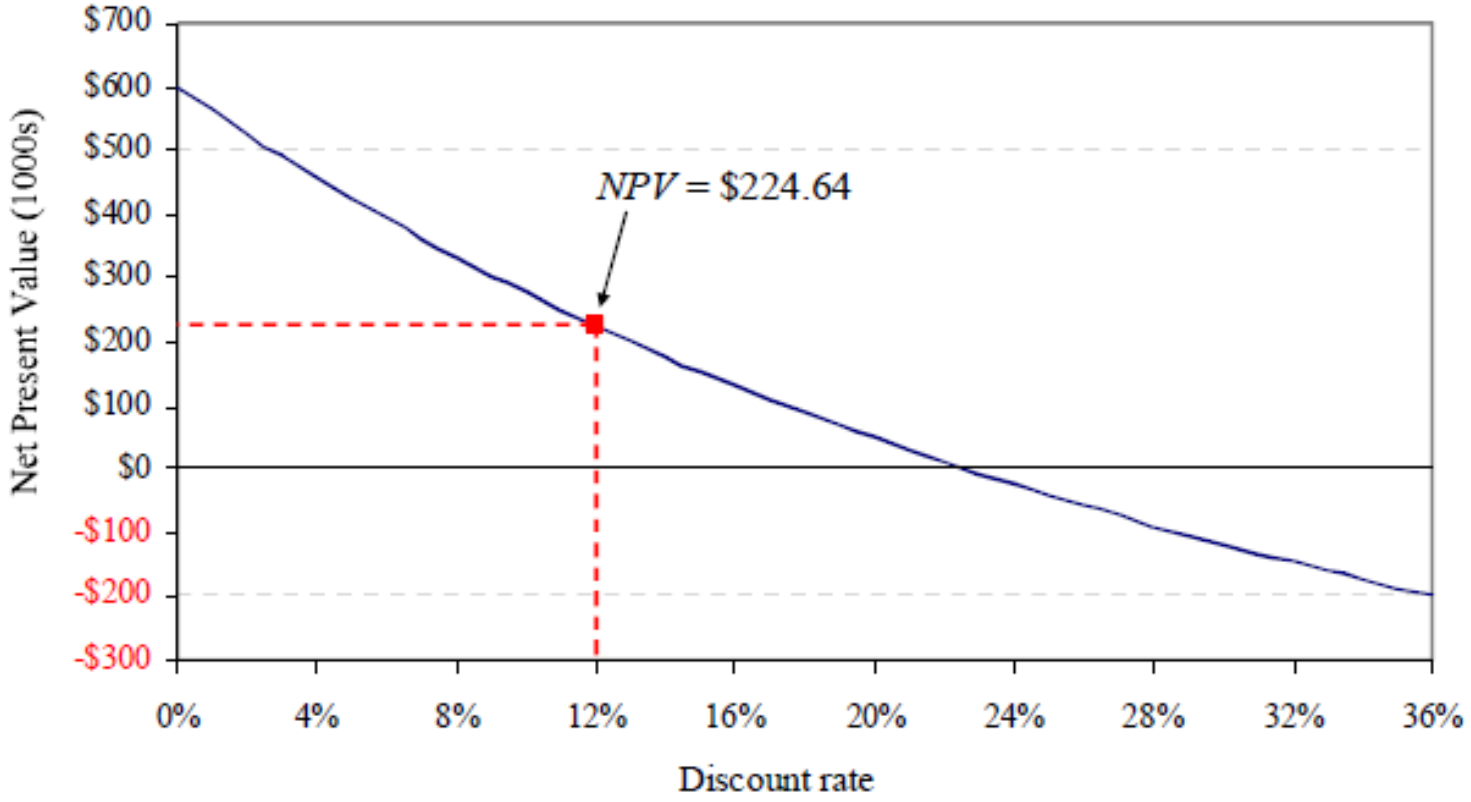
$$NPV = \frac{400}{1.12} + \frac{460}{1.12^2} + \frac{400}{1.12^3} + \frac{340}{1.12^4} - 1000 = \$224.64$$

Since the NPV is positive the project should be accepted.
If the initial investment was $1,300,000 the revised NPV is:

$$NPV = \frac{400}{1.12} + \frac{460}{1.12^2} + \frac{400}{1.12^3} + \frac{340}{1.12^4} - 1300 = -\$75.36$$

What interpretation can be associated with the net present value?

# The Net Present Value Profile



# Internal Rate of Return

The internal rate of return (IRR or r) is the rate of return that is earned by the project over its economic life

Reinvestment rate assumed in the context of the IRR?

Set NPV equal to 0 and compute the internal rate of return (r)

$$NPV \equiv 0 = \frac{C_1}{(1+r)} + \frac{C_2}{(1+r)^2} + \ldots + \frac{C_N}{(1+r)^N} - I_0$$

$$NPV \equiv 0 = \sum_{t=1}^{N} \frac{C_t}{(1+r)^t} - I_0$$

Decision: Accept project if r k, reject if r < k

Note: Point of indifference when r = k

# Internal Rate of Return

The internal rate of return for .simple. projects is relatively easy to compute

Example: Consider a project which involves an initial investment of $100,000 and yields a net cash flow of $150,000 at the end of year 4. What is the IRR of this project?

Compute the IRR by setting the NPV to zero and solving for the IRR in…

$$NPV \equiv 0 = \frac{150000}{(1+r)^4} - 100000$$

$$r = \left(\frac{150000}{100000}\right)^{1/4} - 1 = 10.7\%$$

# Internal Rate of Return

Example: The net cash flows from a four-year project that costs $1,000,000 are as follows. Evaluate the project using the internal rate of return method and assuming that the project's required rate of return is 12% p.a.

| End of Year | Net Cash Flows |
|---|---|
| 0 | -$1,000,000 |
| 1 | $400,000 |
| 2 | $460,000 |
| 3 | $400,000 |
| 4 | $340,000 |

# Internal Rate of Return

Recall: The net present value is of the project was.

$$NPV = \frac{400}{1.12} + \frac{460}{1.12^2} + \frac{400}{1.12^3} + \frac{340}{1.12^4} - 1000 = \$224.64$$

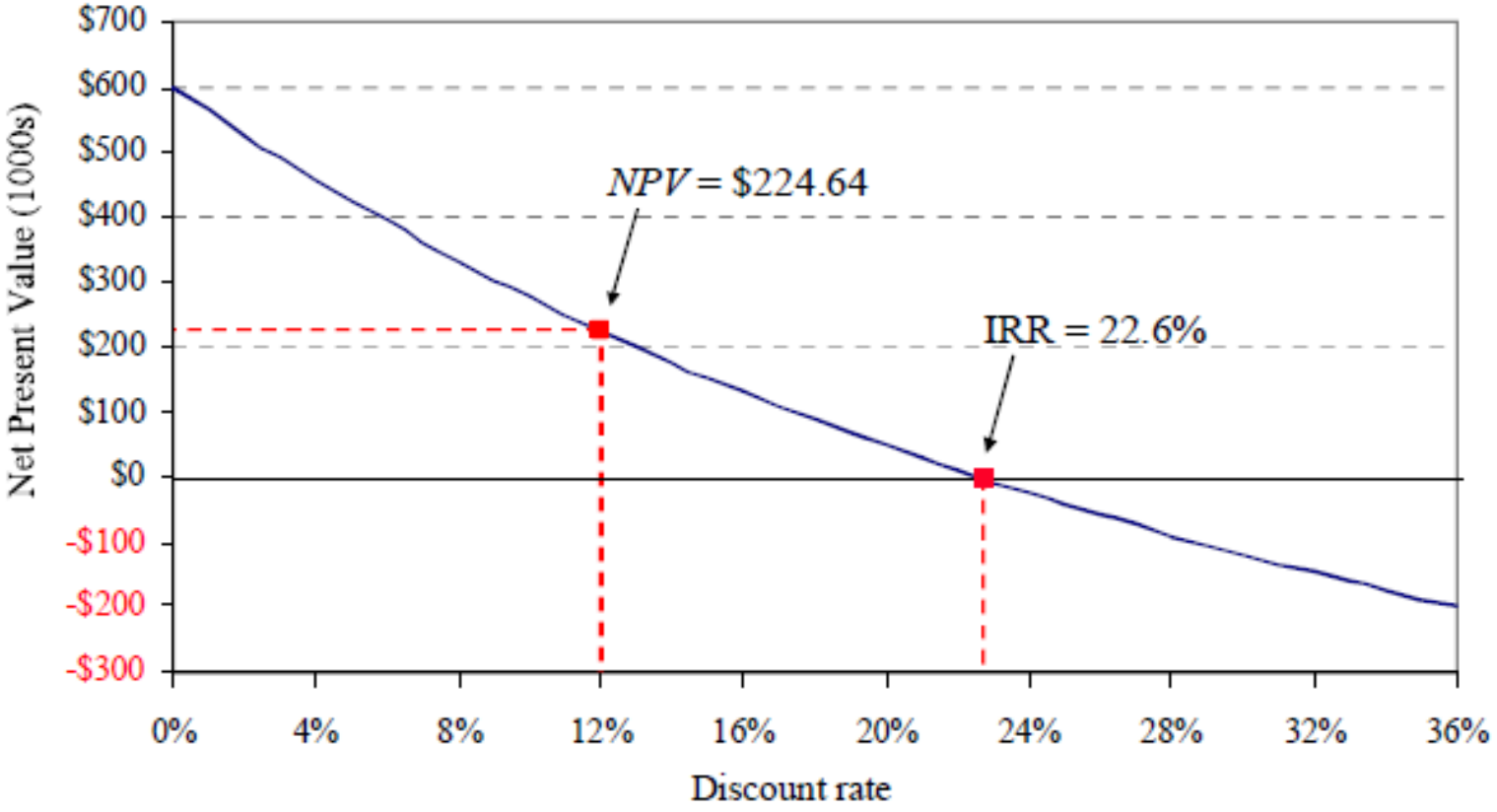
Internal rate of return is obtained by solving for r in…

$$NPV \equiv 0 = \frac{400}{(1+r)} + \frac{460}{(1+r)^2} + \frac{400}{(1+r)^3} + \frac{340}{(1+r)^4} - 1000$$

At r = 22%, NPV = $10.68
At r = 23%, NPV = -$7.25
At r = 22.5%, NPV = $1.65
Actual r = 22.6% > k = 12%

Both rules give the *same decision for individual projects*

# Internal Rate of Return



# Payback Period

A project's payback period is the time it takes for the initial cash outlay on a project to be recovered from the net after-tax cash flows

- Note that in computing the payback period we assume that the cash flows are distributed *evenly over the year (rather than at the* end of each year)

*Decision rule*

- A project is acceptable if its payback period is less than a pre-specified maximum payback period
- For mutually exclusive projects, the project with the shortest payback period is preferred (assuming they all meet the maximum payback period threshold)

# Payback Period

Example: A firm is considering three mutually exclusive projects that require an initial outlay of $100,000 and that generate the following pattern of cash flows. The firm typically accepts projects with a payback period less than 2 years

| Project | Year 1 | Year 2 | Year 3 | Year 4 | Payback |
|---|---|---|---|---|---|
| C | $100,000 | - | - | $10,000 | 1 year |
| D | $50,000 | $50,000 | $50,000 | $50,000 | 2 years |
| E | $50,000 | $30,000 | $30,000 | $90,000 | 2.7 years |
| F | $50,000 | -$30,000 | $60,000 | $40,000 | 3.5 years |

- Payback for project E = 2 + 20/30 = 2.7 years
- Payback for project F = 3 + 20/40 = 3.5 years

Decision?

# Problems With Payback Period

Fails to take account of the cash flows that occur after the payback period cutoff date

Biased against projects that have longer development periods

- Examples: Mining and exploration projects

Ignores the time value of money

Is there any use for the payback period and accounting rate of return methods?

What method(s) should a company use?

# Key Concepts

The NPV method is recommended for investment evaluation

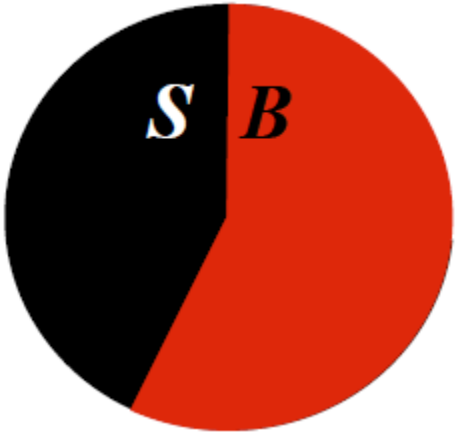
NPV is consistent with maximization of shareholder wealth

NPV is also simple to use and gives rise to fewer problems than the IRR method

The constant chain of replacement assumption is used to evaluate and compare projects of differing lives

# The Capital Structure Decision

# Maximizing Firm value vs. Maximizing Shareholder Interests




If the goal of the firm's management is to make the firm as valuable as possible, then the firm should pick up the debt-equity ratio that makes the pie as big as possible.

Capital Structure decision deals with the right-hand side of the balance sheet (company's financing decisions).

Company can choose among many different capital structure possibilities (fixed-rate or floating-rate debt, off-balance-sheet debt, e,g, operating lease).

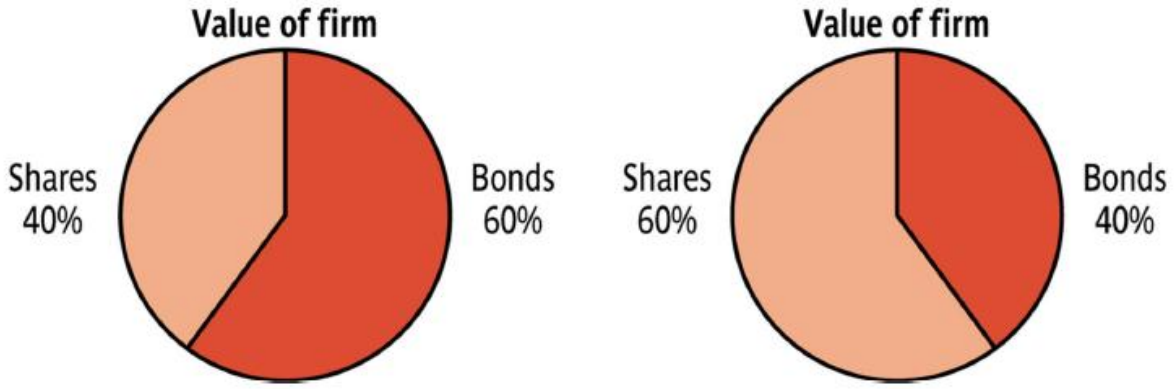
Most important decision: how much external capital is needed

Modigliani and Miller: The market value of any firm is independent of its capital structure (proposition 1).

If operating cash flows are constant and there are no taxes, a company's value is not affected by the amount of debt it carries (capital structure decision is irrelevant).

However, world with no taxes, financial distress costs, asymmetric information and other transaction costs.

# Capital Structure and the Pie




The value of a firm is defined to be the sum of the value of the firm's debt and the firm's equity.

$$V = B + S$$

Their key assumption is that investment and financing decisions and independent decisions.

In reality , when a company carries debt, it incurs interest charges that are tax deductible. As a result they pay less tax to the government.

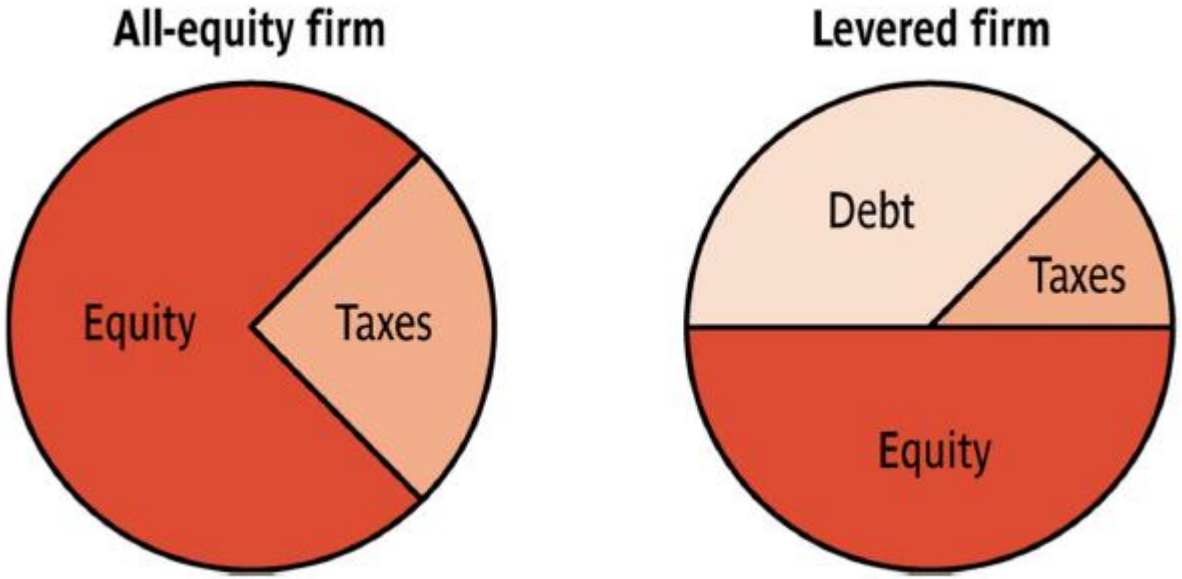
In a world with taxes, companies can be viewed as a partnership between shareholders and government.

Next graphs shows the value of an all-equity company and a leveraged company.

There are three claims on the company's profits: shareholders (stock), debtholders (for instance bonds) ,and government taxes.

Leverage can increase firm value because interest on debt is tax deductible (also called tax shields)

# Corporate Taxes



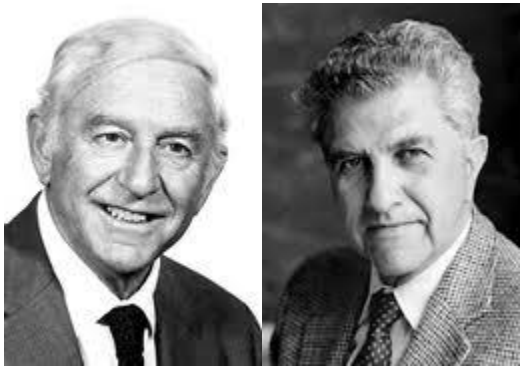

The levered firm pays less in taxes than does the all-equity firm.

Thus the sum of the debt plus the equity of the levered firm is greater than the equity of the unlevered firm

# Modigliani and Miller (MM) Proposition I (No Taxes)

The value of the levered firm is the same as the value of the unlevered firm

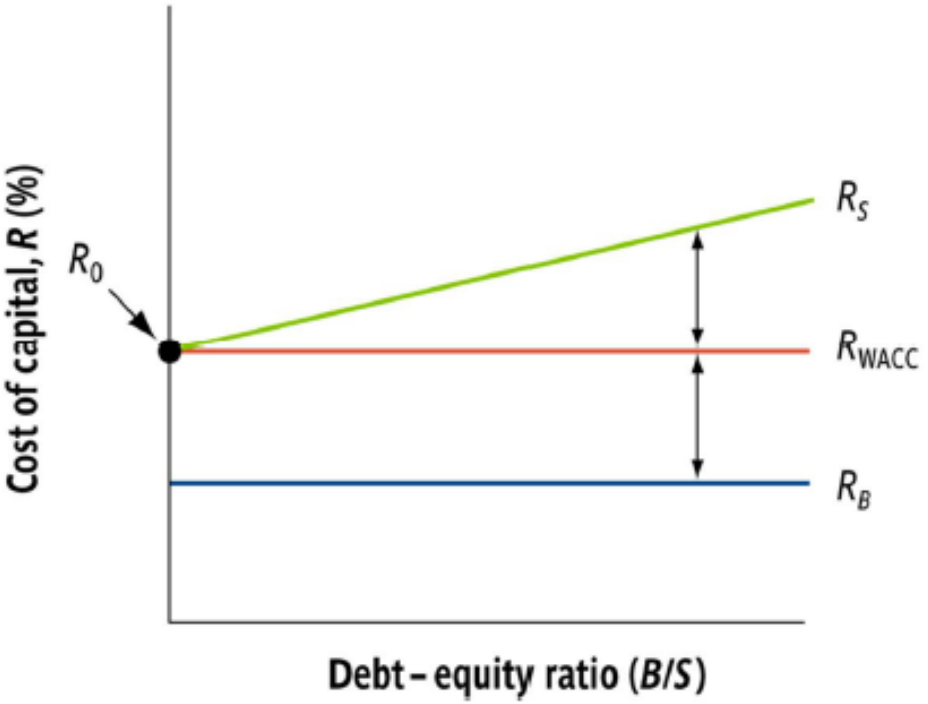
Because stockholders' welfare is directly related to the firm's value, the changes in capital structure cannot affect the stockholders' welfare



MM Proposition I: Key Assumptions

- Individuals can borrow as cheaply as corporations. Is this realistic?
- No taxes
- No transaction Costs

# MM Proposition I (No Taxes)




$$R_S = R_0 + (R_0 - R_B)B/S$$

$R_S$ is the cost of equity.
$R_B$ is the cost of debt.
$R_0$ is the cost of capital for an all-equity firm.
$R_{WACC}$ is a firm's weighted average cost of capital. In a world with no taxes, $R_{WACC}$ for a levered firm is equal to $R_0$.
$R_0$ is a single point whereas $R_S$, $R_B$ and $R_{WACC}$ are all entire lines.

The cost of equity capital, $R_S$, is positively related to the firm's debt–equity ratio. The firm's weighted average cost of capital, $R_{WACC}$, is invariant to the firm's debt–equity ratio.

# Valuing the Tax Savings from Debt

$$Interest = R_b \times B$$

$R_b$: Interest rate

$B$: Amount Borrowed

## Reduction in Corporate Taxes

$$t_C \times R_b \times R$$

$t_C$: Corporate tax rate

$R_b \times R$: Interest Paid

## Assuming Cash Flows are Perpetual, Present Value of Tax Shields

$$\frac{t_C R_b B}{R_b} = t_C B$$

# MM Proposition I with Corporate Taxes

The value of an unlevered firm

$$V_U = \frac{EBIT \times (1 - t_C)}{R_0}$$

## MM Proposition I with Corporate Taxes

$$V_L = \frac{EBIT \times (1 - t_C)}{R_0} + \frac{t_C R_B B}{R_B} = V_U + t_C B$$

# Taxes and Cash Flow

## Example

ABC Company has a corporate tax rate, $\tau_C$, of 35% and expected earnings before interest and taxes (EBIT) of £1 million each year. Its entire earnings after taxes are paid out as dividends

The firm is considering two alternative capital structures.

Under Plan I, ABC would have no debt in its capital structure
Under Plan II, the company would have £4 million of debt, B. The cost of debt, $R_B$ is 10%.

What is the total cash flow to shareholders and bondholders under each scenario?

# Taxes and Cash Flow

## Example

| | Plan I (€) | Plan II (€) |
|---|---|---|
| Earnings before interest and corporate taxes (EBIT) | 1,000,000 | 1,000,000 |
| Interest ($R_B B$) | 0 | 400,000 |
| Earnings before taxes (EBT) = (EBIT – $R_B B$) | 1,000,000 | 600,000 |
| Taxes ($t_C = 0.35$) | 350,000 | 210,000 |
| Earnings after corporate taxes (EAT) = [(EBIT – $R_B B$) × (1 – $t_C$)] | 650,000 | 390,000 |
| Total cash flow to both shareholders and bondholders [EBIT × (1 – $t_C$) + $t_C R_B B$] | 650,000 | 790,000 |

## How can a company change its capital structure relatively quickly?

Leveraged recapitalization: debt-financed share buyback program

This implies an increase in debt and a reduction in equity. As a result of the debt increase, the tax shield is higher and so is the firm value.

Example

A company has a 25% tax rate and 200 shares outstanding that are valued at $25 each.
The total market of equity is $5,000. Originally company has no debt: thus the value of the company is $5,000 as well.
Company announces an issue of $2,000 in debt that will be used to buy back shares.
Assuming the $2,000 debt funding is permanent, the present value of interest tax shield is $500 ($2{,}000 \times 25\%\ tax\ rate$)
Thus the market value of the company is equal to $5,500

After the buyback program is announced, the share price exceeds the prior share price by the per share amount of the PVTS.
Therefore, the share price goes up to $27.50.

At that price, the $2,000 of debt will allow the repurchase of 72.72 shares.

| | Before: 100% equity financed | After buyback announcement, but before actual buyback | After buyback |
|---|---|---|---|
| Number of shares | 200 | 200 | 127.2727 |
| Price per share | $25 | $27.50 | $27.50 |
| Market Value of Equity | $5,000 | $5,500 | $3,500 |
| Debt | $0 | $0 | $2,000 |
| Value of Company | $5,000 | $5,500 | $5,500 |
| Debt/market value of equity | 0 | 0 | 57% |

## Additional benefits of debt

Reduces the agency costs of free cash flows (free cash flow hypothesis, Michael Jensen)

Forces managers to further optimize the company's resources, committing them to operate more efficiently

Indeed, this benefit of debt underlies the majority of leveraged buyouts (LBOs) used in private equity sector.

By leveraging the company shareholders obtain two benefits:

- Their own equity investment is reduced
- There are strong incentives for managers to perform well and deliver on the debt's scheduled payments

## How much to borrow?

There are however costs associated with debt that will explore next

## Cost of debt goes up with leverage

Cost of debt is not constant (as assumed in Modigliani and Miller proposition 1).

$$r_{debt} = r_f + spread$$

Key ratios for global companies

| | Operating Margin | EBIT/Interest Expense | Debt/EBITDA | Debt/Equity (%) |
|---|---|---|---|---|
| Aaa | 20.3 | 21.6 | 1.0 | 24.7 |
| Aa | 13.1 | 9.6 | 1.7 | 35.4 |
| A | 11.2 | 6.9 | 2.2 | 43.5 |
| Baa | 10.9 | 4.2 | 2.9 | 47.0 |
| Ba | 11.1 | 3.0 | 3.3 | 51.1 |
| B | 8.0 | 1.4 | 5.1 | 72.3 |
| C | 2.7 | 0.4 | 7.6 | 98.1 |

# Credit Spreads for different ratings

| Investment Grade | |
|---|---|
| AAA | 0.21% |
| AA | 0.34% |
| A+ | 0.48% |
| A | 0.56% |
| A- | 0.88% |
| BBB+ | 0.94% |
| BBB | 1.13% |
| BBB- | 1.70% |

| Junk Bonds | |
|---|---|
| BB+ | 2.18% |
| BB | 2.41% |
| BB- | 2.64% |
| B+ | 3.14% |
| B | 3.41% |
| B- | 4.08% |

Bloomberg, January, 2014

## Cost of equity goes up with leverage

Under normal conditions, equity holders of leveraged companies have higher expected returns than holders of unleveraged companies, however , they also incur in higher risks

Debt and Risk (three scenarios)

Current Capital Structure
NO DEBT

| | Current |
|---|---|
| Assets | €8,000 |
| Debt | €0 |
| Equity (market and book) | €8,000 |
| Interest rate | 10% |
| Market value/share | €20 |
| Shares outstanding | 400 |

| | Recession | Expected | Expansion |
|---|---|---|---|
| Return on assets (ROA) | 5% | 15% | 25% |
| Earnings | €400 | €1,200 | €2,000 |
| Return on equity (ROE) = Earnings/Equity | 5% | 15% | 25% |
| Earnings per share (EPS) | €1.00 | €3.00 | €5.00 |

No debt: ROA equals ROE in all scenarios

Proposed Capital Structure
Debt = 4,000

| | Proposed |
|---|---|
| Assets | €8,000 |
| Debt | €4,000 |
| Equity (market and book) | €4,000 |
| Interest rate | 10% |
| Market value/share | €20 |
| Shares outstanding | 200 |

| | Recession | Expected | Expansion |
|---|---|---|---|
| Return on assets (ROA) | 5% | 15% | 25% |
| Earnings before interest (EBI) | €400 | €1,200 | €2,000 |
| Interest | −400 | −400 | −400 |
| Earnings after interest | €0 | €800 | €1,600 |
| Return on equity (ROE) | | | |
| = Earnings after interest/Equity | 0 | 20% | 40% |
| Earnings per share (EPS) | 0 | €4.00 | €8.00 |

Leveraged shareholders have better returns in good times and worse returns in bad times.

Leveraged company is riskier for its equity holders.
The cost of equity of a leverage company must be higher than that of an unleveraged company

## Proposition II

Leverage increases the risk and return to stockholders

$$R_S = R_0 + (B/S_L) \times (R_0 - R_B)$$

$R_S$ is the return on (levered) equity (cost of equity)
$R_0$ is the return on (unlevered) equity (cost of capital)
$B$ is the value of debt
$S_L$ is the value of levered equity
$R_B$ is the interest rate (cost of debt)

Because levered equity has greater risk, it should have a greater expected return as compensation.

# MM Propositions with Taxes

## Summary

### Assumptions

- Corporations are taxed at the rate $t_C$, on earnings after interest
- No transaction costs
- Individuals and corporations borrow at same rate

### Proposition I

- $V_L = V_U + t_C B$ (for a firm with perpetual debt)

- Because corporations can deduct interest payments, corporate leverage lowers tax payments

# MM Propositions with Taxes

## Summary (Cont.)

### Proposition II

$$R_S = R_0 + \frac{B}{S}(1 - t_C)(R_0 - R_B)$$

- The cost of equity rises with leverage because the risk to equity rises with leverage
- Value is positively related to leverage.

# Review: Modigliani and Miller (MM) Proposition I Assumptions

Individuals and corporations borrow at same rate

No tax (for MM Proposition without tax)

No transaction costs

No costs of financial distress

# Description of Financial Distress Costs

## Direct Costs

Legal and Administrative Costs

## Indirect Costs

Impaired ability to conduct business (e.g., lost sales)

## Agency costs

Incentive to take large risks
Incentive toward underinvestment
Milking the property

# Can costs of debt be reduced?

## Protective covenants

Incorporated as part of the loan document (or indenture) between stockholders and bondholders

A negative covenant limits or prohibits actions that the company may take

A positive covenant specifies an action that the company agrees to take or a condition the company must bear by

## Debt consolidation

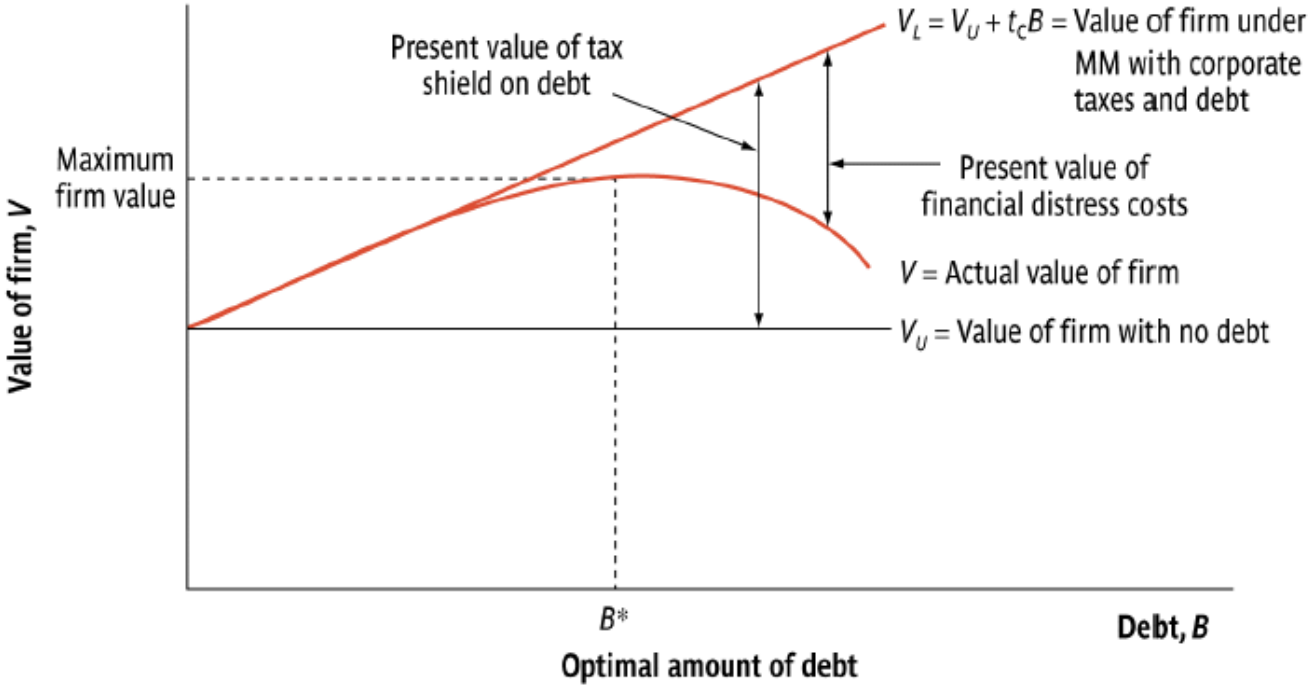
If we minimize the number of parties, contracting costs fall.

# Protective covenants Example

| Positive | Negative |
| --- | --- |
| Maintain working capital at a minimum level | Limitations on the amount of dividends a company may pay |
| Provide periodic financial statements to the lender | Cannot pledge any of its assets to other lenders |
| | Cannot merge with another firm |
| | Cannot sell or lease major assets without approval by the lender |
| | Cannot issue additional long-term debt |

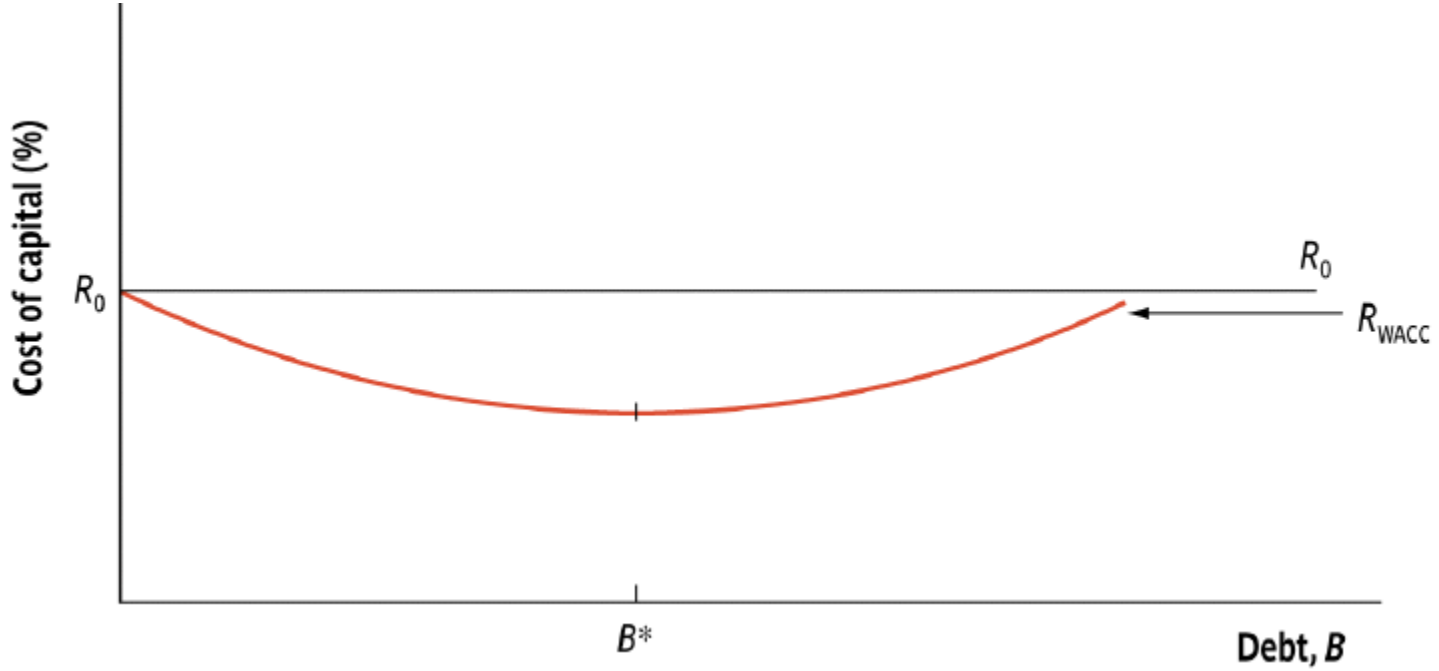
# Tax effects and Financial Distress

There is a trade-off between the tax advantage of debt and the costs of financial distress




The tax shield increases the value of the levered firm.
Financial distress costs lower the value of the levered firm
Two offsetting factors produce an optimal amount of dent at $B^*$

# Integration of Tax Effects and Financial Distress Costs

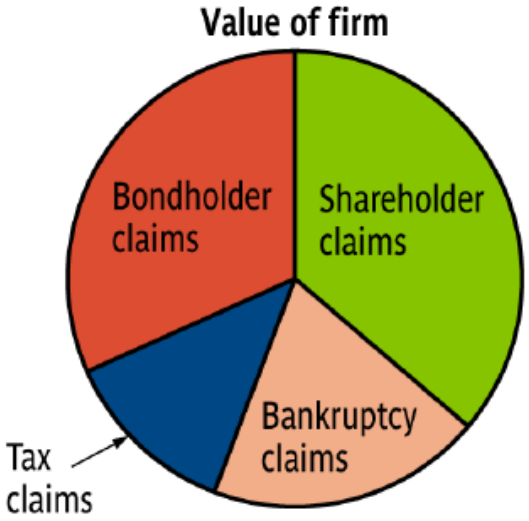


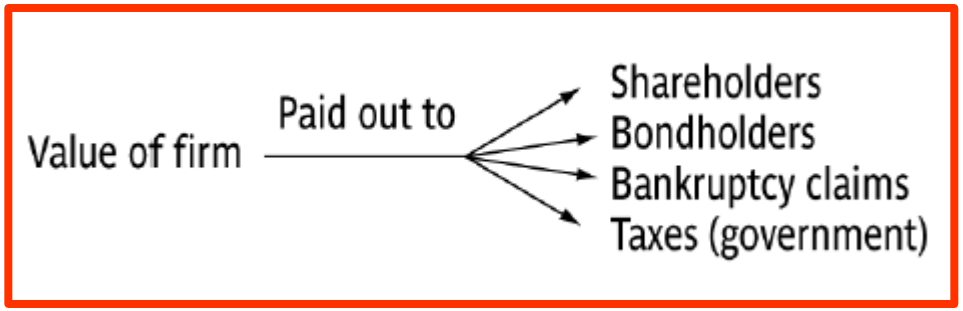

$R_{WACC}$ falls initially because of the tax advantage of debt

Beyond point $B^*$ , it begins to rise because of financial distress costs

Bankruptcy costs increase faster than the tax shield beyond $B^*$, implying a reduction in firm value further leverage.

# The Pie Model Revisited




Taxes and bankruptcy costs can be viewed as just another claim on the cash flows of the firm.

The essence of the M&M is that the value of firm depends on the cash flow of the firm; capital structure just slices the pie.

# Signalling

The firm's capital structure is optimized where the marginal subsidy to debt equals the marginal cost.

Investor's view debt as a signal of firm value

- Firms with low anticipated profits will take on a low level of debt
- Firms with high anticipated profits will take on a high level of debt

A manager that takes on more debt than is optimal in order to fool investors will pay the cost in the long run.

# The Pecking-Order Theory

The theory provides the following two rules for the real world

Rule 1
Use internal financing first

Rule 2
Issue debt next, new equity last

The Pecking-order theory is at odds the trade-off theory:

- There is no target D/E ratio
- Profitable firms use less debt
- Companies like financial slack

# How Firms establish Capital Structure

Most non-financial corporations have low debt-asset ratios

There are differences in capital structure across industries

A number of firms use no debt

Most corporations employ target debt-equity ratios

# Factors in Target D/E ratio

## Taxes

Since interest is tax deductible, highly profitable firms should use more debt (i.e., greater tax benefit)

## Types of assets

The costs of financial distress depend on the types of assets the firm has.

## Uncertainty of Operating Income

Even without debt, firms with uncertain operating income have a high probability of experiencing financial distress

# What managers consider important in deciding on how much debt to carry...

A survey of Chief Financial Officers of large U.S. companies provided the following ranking (from most important to least important) for the factors that they considered important in the financing decisions

| Factor | Ranking (0-5) |
|---|---|
| Maintain financial flexibility | 4.55 |
| Ensure long-term survival | 4.55 |
| Maintain Predictable Source of Funds | 4.05 |
| Maximize Stock Price | 3.99 |
| Maintain financial independence | 3.88 |
| Maintain high debt rating | 3.56 |
| Maintain comparability with peer group | 2.47 |

# Preference rankings long-term finance: Results of a Survey

| Ranking | Source | Score |
|---|---|---|
| 1 | Retained Earnings | 5.61 |
| 2 | Straight Debt | 4.88 |
| 3 | Convertible Debt | 3.02 |
| 4 | External Common Equity | 2.42 |
| 5 | Straight Preferred Stock | 2.22 |
| 6 | Convertible Preferred | 1.72 |

# Levered and Unlevered Beta

In a perfect world… we would estimate the beta of a firm by doing the following:

1) Start with the beta of the business that the firm is in

2) Adjust the business beta for the operating leverage of the firm to arrive at the unlevered beta for the firm.

3) Use the financial leverage of the firm to estimate the equity beta for the firm

$$Levered\ Beta = Unlevered\ Beta\left(1 + (1 - tax\ rate)(Debt/Equity)\right)$$

Within any business:

Firms with lower fixed costs (as a percentage of total costs) should have lower unlevered betas.

If you can compute: fixed and variable costs for each firm in a sector, you can break down the unlevered beta into business and operating leverage components.

$$Unlevered\ Beta = Pure\ Business\ Beta \times \left(1 + (Fixed\ Costs/Variable\ Costs)\right)$$

The biggest problem with doing this is informational.
It is difficult to get information on fixed and variable costs for individual firms.

In practice, we tend to assume that the operating leverage of firms within a business are similar and use the same unlevered beta for every firm.

# Adjusting for financial leverage

## Conventional approach

If we assume that debt carries no market risk (has a beta of zero), the beta of equity alone can be written as a function of the unlevered beta and the debt-equity ratio

$$\beta_U = \frac{\beta_L}{\left[1 + (1 - \tau_C) \times \frac{D}{E}\right]}$$

Where:

$\beta_L$ is the firm's beta with leverage.

$\beta_U$ is the firm's beta without leverage

$\tau_C$ is the corporate tax rate.

$D/E$ is the company's debt/equity ratio.

Metric that compares the risk of an unlevered company to the risk of the market.

The unlevered beta is the beta of a company without any debt.

*Unlevering* a beta removes the financial effects from leverage.

The formula to calculate a company's unlevered beta is:

## Debt Adjusted Approach

If beta carries market risk and you can estimate the beta of debt, you can estimate the levered beta as follows:

$$\beta_L = \beta_U(1 + (1 - \tau_C)\, D/E) - \beta_{Debt}(1 - \tau_C)(D/E)$$

While the latter is more realistic, estimating betas for debt can be difficult to do.

# Evidence on Capital Structure

More profitable firms tend to use less leverage

High-growth firms borrow less than mature firms do

Stock market generally views leverage-increasing events positively

Tax deductibility of interest gives firms an incentive to use debt

# Recommended Reading

Debt and Taxes: Evidence from Bank-financed Small and Medium-sized Firms
http://ssrn.com/abstract=672104 or http://dx.doi.org/10.2139/ssrn.672104

Financing of SME's: And Asset Side Story
http://ssrn.com/abstract=1098347 or http://dx.doi.org/10.2139/ssrn.1098347

Taxes and Corporate Debt Policy: Evidence for Unlisted Firms of Sixteen European Countries
http://ssrn.com/abstract=1098370 or http://dx.doi.org/10.2139/ssrn.1098370

# The Weighted Average Cost of Capital

- The weighted average cost of capital (WACC or $k_0$) is the benchmark required rate of return used by a firm to evaluate its investment opportunities
  - The discount rate used to evaluate projects of similar risk to the firm

- It takes into account how a firm finances its investments
  - How much debt versus equity does the firm employ?

- The WACC depends on…
  - Qualitative factors
  - The market values of the alternative sources of funds
  - The market costs associated with these sources of funds

# Estimating the WACC

- The main steps involved in the estimation of the WACC are…
  - Identify the financing components
  - Estimate the current (or market) values of the financing components
  - Estimate the cost of each financing component
  - Estimate the WACC

- We will consider each step for typical financing components

# Identify the Financing Components

- Debt
  - Identify all externally supplied debt items
  - Do not include creditors and accruals as these costs are already included in net cash flows
- Ordinary shares
  - Obtain number of issued shares from the balance sheet
  - Do not include reserves and retained earnings
- Preference shares
  - Obtain number of issued shares from the balance sheet

# Valuing the Financing Components

- Use market values and not book values
- Value coupon paying debt using the following pricing relation (see Lecture 3)

$$P_0 = \frac{C_1}{(1+k_d)} + \frac{C_2}{(1+k_d)^2} + \ldots + \frac{C_n}{(1+k_d)^n} + \frac{F_n}{(1+k_d)^n}$$

$$P_0 = \sum_{t=1}^{n} \frac{C_t}{(1+k_d)^t} + \frac{F_n}{(1+k_d)^n}$$

where $P_0$ = Market price of the debt security

$C_t$ = Periodic interest payment on debt in period $t$

$k_d$ = Required rate of return on debt

# Valuing Long Term Debt

Example: BLD Ltd has 10,000 bonds outstanding and each bond has a face value of $1,000 with two years remaining to maturity. The bonds pay coupons (or interest) at a rate of 10% p.a. every six months. If the market interest rate appropriate for the bond is 15% p.a., what is the current price of each bond? What is the total market value of debt in BLD Ltd's capital structure?

# Valuing Long Term Debt

- Coupon (or interest) payments are made every six months
- Number of payments, n = 4, semi-annual payments
- Annual interest payments = 0.10(1000) = $100.00
  - So, semi-annual interest payments = $50.00
- Repayment of principal at the end of year 2 = $1000.00
- Required return on debt, $k_d$ = 15% p.a.
- So, semi-annual required return on debt, $k_d$ = 7.5%

# Valuing Long Term Debt

The price of the bond is…

$$P_0 = \frac{50}{(1.075)^1} + \frac{50}{(1.075)^2} + \frac{50}{(1.075)^3} + \frac{1050}{(1.075)^4}$$

$P_0$ = \$916.27

- So, total value of debt = 10000(916.27) = \$9,162,700

- Note: As the coupon rate is lower than the market rate, the price is less than the face value, that is, the bond is selling at a discount to face value
  - If the coupon rate is greater than the market rate, the price would be at a premium to face value

# Valuing Ordinary Shares

- Example: ABC Ltd has 300,000 shares on issue which each have a par value of $1.00. If the shares are currently trading at $3.50 each what is the total market value of ABC's ordinary shares?

- There are 300,000 shares on issue with a market value of $3.50 per share

- Market value of equity = 300000 × 3.50 = $1,050,000
    - The par (or book) value of shares is not relevant here

# Valuing Preference Shares

- Preference shares pay a fixed dividend at regular intervals
- If the shares are non-redeemable, then the cash flows represent a perpetuity and the market value can be computed as…

- $P_0 = D_p/k_p$

Where

$P_0$ = The current market price
$D_p$ = Value of the periodic dividend
$k_p$ = Required return on preference shares

# Valuing Preference Shares

• Example: Assume the preference shares of XYZ Ltd pay a dividend of $0.40 p.a. and the cost of preference shares is 10% p.a. What is the price of the preference shares? If XYZ Ltd has 500,000 preference shares outstanding, what is the market value of these shares?

•The cash flows from the preference shares are…

- $D_p$ = $0.40 per share
- So, $P_0$ = 0.40/0.10 = $4.00
- Market value of shares = 500000 × 4.00 = $2,000,000

# Estimating the Costs of Capital

- The costs of a firm's financing instruments can be obtained as follows…
  - Use observable market rates - may need to be estimated
  - Use effective annual rates
  - For the cost of debt use the market yield

- Focus here is on the costs of debt, ordinary shares and preference shares
  - Note: We ignore the complications of flotation costs and franking credits associated with dividends (sections 15.5.3 and 15.5.5 of the text)

# Cost of Debt

- Example: The bonds of ABD Ltd have a face value of $1,000 with one year remaining to maturity. The bonds pay coupons at the rate of 10 percent p.a. If the current market price of the bonds is $1,018.50, what is the firm's cost of debt?

- The annual interest (coupon) paid on the debt is…
  - 1000 × 0.10 = $100

- So, 1018.50 = (1000 + 100)/(1 + kd)
- $k_d$ = (1100/1018.50) – 1 = 8.0%

# Cost of Ordinary Shares

It is common to use CAPM to estimate the cost of equity capital, where the cost of equity is…

$$k_e = r_f + [E(r_m) - r_f]\beta_e$$

where $E(r_m) - r_f$ = Expected market risk premium

$r_f$ = Risk free rate

$\beta_e$ = Equity beta

- Note that the equity beta is the estimate of the firm's relative "risk" compared to movements in the market portfolio
  - The market risk premium is typically estimated using historical market data
  - The riskfree rate is typically based on the long term government bond rate

# Cost of Ordinary Shares

Example: Assume that the risk free rate is 6 percent, the expected market risk premium is 8 percent and the equity beta of XYW Ltd's equity is 1.2. What is the firm's cost of equity capital?

Using the CAPM, we have…

- $k_e = r_f + [E(r_m) - r_f]\beta_e$
- $k_e = 0.06 + 0.08 \times 1.2 = 15.6\%$

Note: Can also use the dividend discount models covered in Lecture 4 (but not commonly used by managers…)

- $P_0 = D_1/(k_e - g)$
- So, $k_e = D_1/P_0 + g$

# Cost of Preference Shares

- Recall that, $P_0 = D_p/k_p$

- Thus, $k_p = D_p/P_0$

- Example: The preference shares of DBB Ltd pay a dividend of $0.50 p.a. If the preference shares are currently selling for $4.00 per share, what is the cost of these shares to the firm?

- The cost of preference shares is given as…

$$k_p = D_p/P_0$$

So, $k_p = 0.50/4.00 = 12.5\%$

# Weighted Average Cost of Capital

The weighted average cost of capital (ko) uses the cost of each component of the firm's capital structure and weights these according to their relative market values

Assuming that only debt and equity are used, we have…

$$k_o = k_d(D/V) + k_e(E/V)$$

where $k_d$ = Cost of debt

$k_e$ = Cost of equity

$D$ = Market value of debt

$E$ = Market value of equity

$V = D + E$

# Weighted Average Cost of Capital

Assuming that preference shares are used as well as debt and equity…

$$k_o = k_d(D/V) + k_e(E/V) + k_p(P/V)$$

where $P$ = Market value of preference shares

$k_p$ = Cost of preference shares

$V = D + E + P$

- Be careful of rounding errors in initial calculations
- Be careful to work in consistent terms
  - Calculations in percentages versus decimals
- Check your answers with some common sense logic…

❖ $k_e > k_p > k_d > k_d(1 - t_c)$ (Why?)

# Taxes and the WACC

- Under the classical tax system…
  - Interest on debt is tax deductible
  - Dividends have no tax effect for the firm

- The after-tax cost of debt, $k'_d = (1 - t_c)\, k_d$
  where $t_c$ *corporate tax rate*

- The cost of equity (*ke) is unaffected*

- The after-tax WACC is defined as…

$$k_o = k_d(1 - t_c)(D/V) + k_e(E/V) \qquad and$$
$$k_o = k_d(1 - t_c)(D/V) + k_e(E/V) + k_p(P/V)$$

# Calculating and Using the WACC

Example: You are given the following information for BCA Ltd. Note that book values are obtained from the firm's balance sheet while market values are based on market data.

The firm's marginal tax rate is 30%. Estimate the firm's before-tax and after-tax weighted average costs of capital

| | Book values | Market values | Market costs |
|---|---|---|---|
| Bonds | $30,000,000 | $50,000,000 | 8.0% |
| Preference shares | $10,000,000 | $20,000,000 | 10.0% |
| Ordinary shares | $60,000,000 | $80,000,000 | 14.0% |
| Total | $100,000,000 | $150,000,000 | |

# Calculating and Using the WACC

- Before-tax weighted average cost of capital
  - WACC weights are based on market values so book values are not relevant

$$k_o = k_d(D/V) + k_e(E/V) + k_p(P/V)$$
$$V = D + E + P$$

| | Market values | Weights | Market costs | Weights×Costs |
|---|---|---|---|---|
| Bonds | $50,000,000 | 0.333 | 8.0% | 2.67% |
| Preference shares | $20,000,000 | 0.133 | 10.0% | 1.33% |
| Ordinary shares | $80,000,000 | 0.533 | 14.0% | 7.47% |
| Total | $150,000,000 | 1.000 | | 11.47% |

Note: Weight in bonds, D/V = 50/150 = 0.333, and so on

- Before-tax cost of capital = 11.47%

# Calculating and Using the WACC

The after-tax cost of capital requires the after tax **cost of debt**

$$k'_d = k_d(1 - t_c)$$
$$k'_d = 0.08(1 - 0.30) = 5.6\%$$

| | Market values | Weights | After tax market costs | Weights×Costs |
|---|---|---|---|---|
| Bonds | $50,000,000 | 0.333 | 5.6% | 1.87% |
| Preference shares | $20,000,000 | 0.133 | 10.0% | 1.33% |
| Ordinary shares | $80,000,000 | 0.533 | 14.0% | 7.47% |
| Total | $150,000,000 | 1.000 | | 10.67% |

- Note: Weight in bonds, D/V = 50/150 = 0.333, and so on
  - After-tax cost of capital = 10.67%

# Returning Money to Shareholders

## Dividends, Buybacks and the Payout Policy

# Dividend Policy

Analyze the circumstances when dividend policy is irrelevant

Examine dividend policy in a classical taxation system and an imputation tax system

Summarize the main factors affecting dividend policy

# Cash Dividends

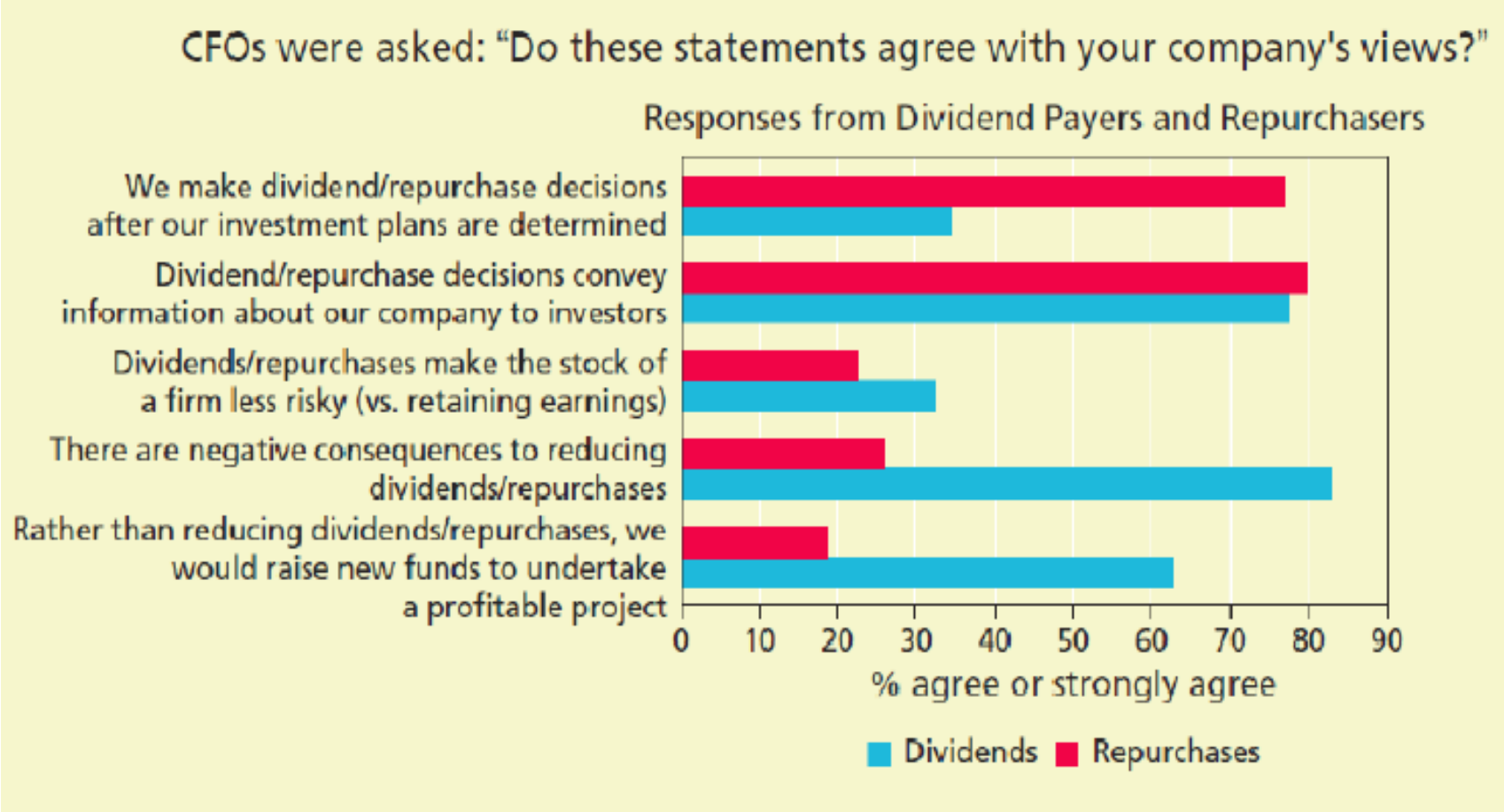
Regular cash dividend: cash payments made directly to stockholders,

Extra cash dividend: indication that the “extra” amount may not be repeated in the future

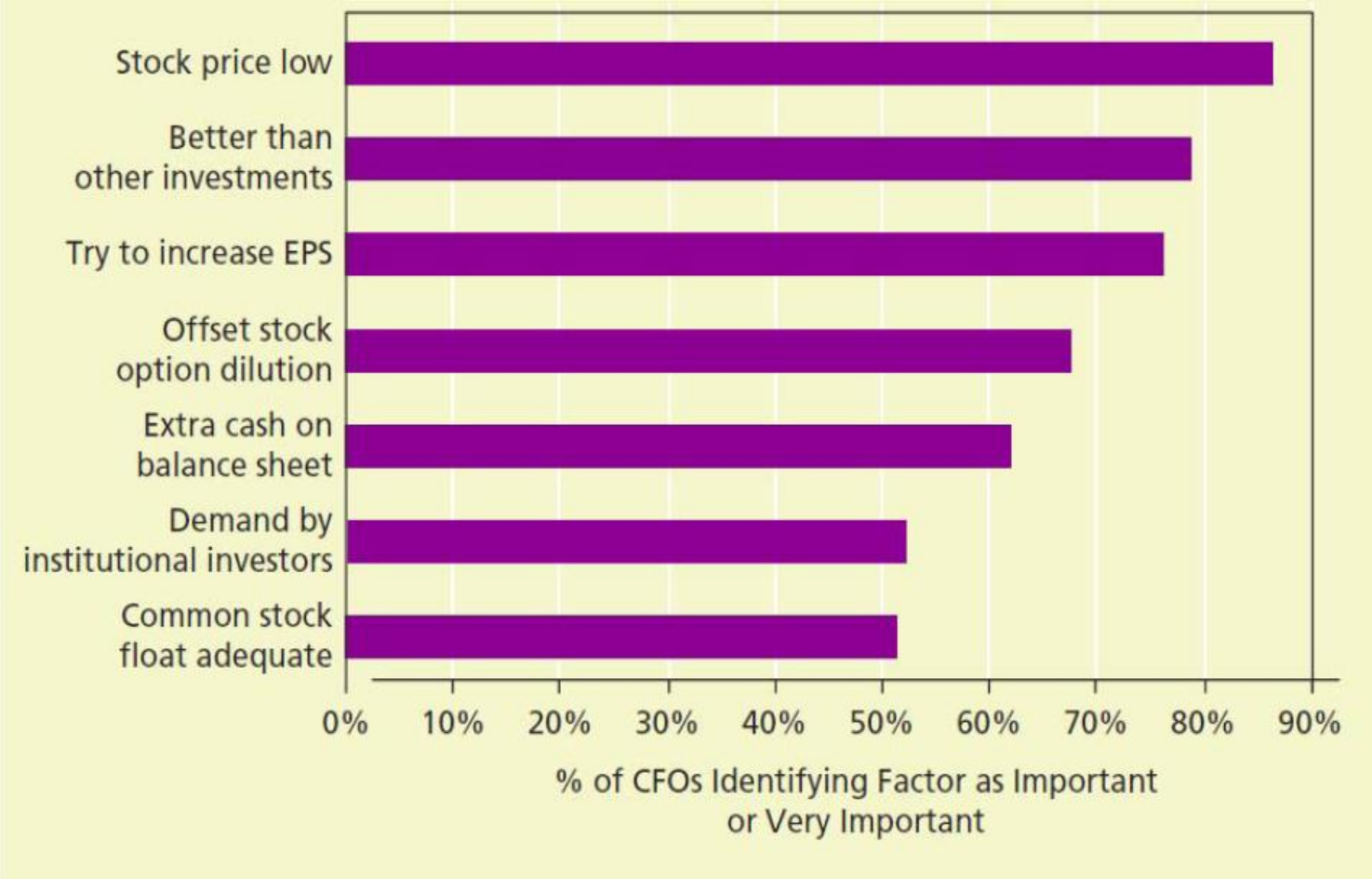
Special cash dividend: similar to extra dividend, but definitely won’t be repeated

Liquidating dividend: some or all of the business has been sold

# CFOs' views on Dividends and Repurchases



# Important Factors in the decision to repurchase Shares



# Institutional Features of Dividends

Dividend declaration (or announcement) date

Ex-dividend date, which is 4 (?) business days before the record date

Record (or books closing) date
The date on which shareholders of record receive the announced dividend
This gives brokers time to notify the share register and ensure that the new shareholders receive the dividend

Payment date
Date dividend is mailed or paid electronically

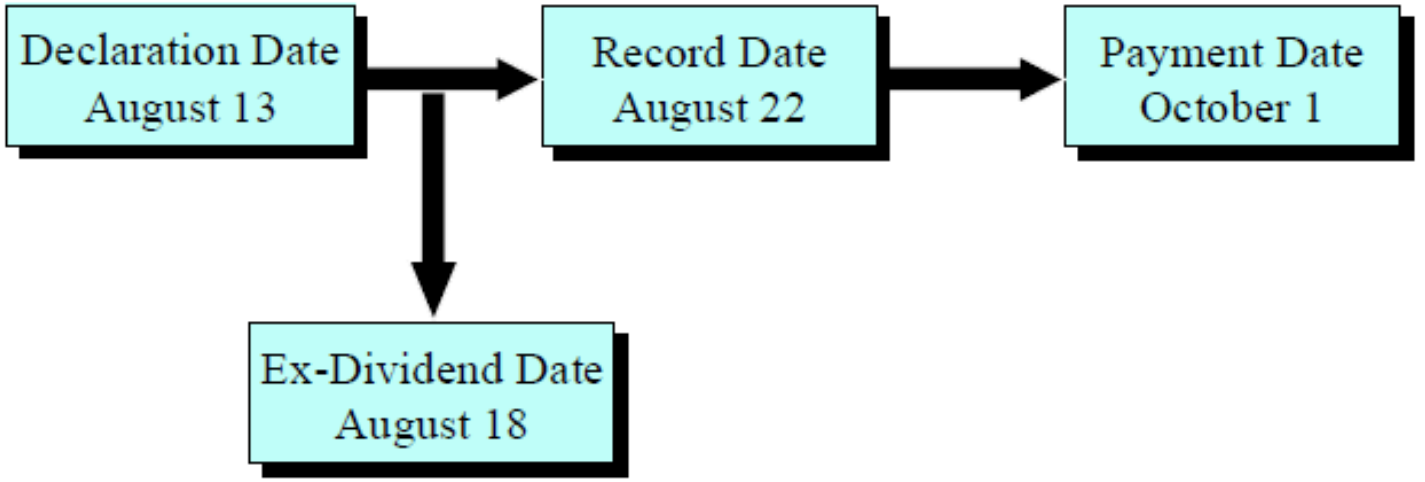
# Institutional Features of Dividends

Interim and final dividends announced by the Commonwealth Bank (ASX code: CBA) in 2008

| | |
|---|---|
| $1.13 interim dividend announced | 13 February 2008 (Wednesday) |
| Ex-dividend date | 18 February 2008 (Monday) |
| Record date | 22 February 2008 (Friday) |
| Interim dividend payment date | 2 April 2008 (Wednesday) |
| $1.53 final dividend announced | 13 August 2008 (Wednesday) |
| Ex-dividend date | 18 August 2008 (Monday) |
| Record date | 22 August 2008 (Friday) |
| Final dividend payment date | 1 October 2008 (Wednesday) |

*Source:* CBA's website at *shareholders.commbank.com.au*

# Institutional Features of Dividends




The final dividend of $1.53 declared by CBA on August 13 is payable on October 1 to shareholders of record at August 22

The ex-dividend date is 4 business days (?) before the record date

Stock trades without the dividend ("ex dividend") from August 18 onwards
It trades with the dividend ("cum dividend") up to and including August 17
What will happen to the price of shares on the ex-dividend date?

# Dividend Payout Policies

Pure residual dividend policy
Pay out any earnings that the firm does not need to reinvest
Dividends and dividend payout ratios tend to be unstable

Smoothed (or fixed) dividend policy
Target a proportion of earnings to be paid out as dividends
Objective here is for the dividends to equal the long run difference between expected earnings and expected capital expenditures - Stable dividends over time

Constant payout dividend policy
Pay a constant proportion of earnings as dividends
Stable dividend payout ratio but unstable dividends

# MM and the Dividend Irrelevance Theory

The main assumptions underlying the irrelevance theory are…
Perfect capital market
The firm can issue and sell new shares when needed
No personal taxes
The firm is all equity financed
The firm has a given investment plan which is not affected by changes in dividends

Firm value is determined only by what earnings are generated by the firm's assets
The manner in which the earnings stream is divided between dividends and retained earnings **does not** affect shareholders' wealth

# MM and the Dividend Irrelevance Theory

Recall that the price of ordinary shares is…

$$P_0 = (D_1 + P_1)/(1 + k_e)$$

Since the price at time 1 depends on the dividend in time 2, and so on, we get…

$$P_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1 + k_e)^t}$$

The puzzle…

If the price today depends on the stream of future dividends how can a firm's dividend policy be irrelevant?

Investors should care about how much of earnings are paid out as dividends!

# MM and the Dividend Irrelevance Theory

Dividend policy is a trade-off between…
Retaining profits, versus
Paying dividends and issuing new share issues to replace the dividends paid out

The overall effect of paying a dividend and issuing new shares to replace the cash is…
No change in the value of the firm

No change in the wealth of the old shareholders

The value of their shares will fall by an amount equal to the cash paid to them

# MM and the Dividend Irrelevance Theory

| *Sources of funds* | |
|---|---|
| Cash from operations | $X$ |
| Cash from *new* shares issued (Number of shares = $m$) | $mP_1$ |
| *Uses of funds* | |
| Dividends paid (Number of shares = $n$) | $nD_1$ |
| Investments | $I$ |

Since the sources and uses of funds must be equal, we have…

$X + mP_1 = nD_1 + I$

Alternatively, $mP_1 = nD_1 + I - X$

# MM and the Dividend Irrelevance Theory

If the firm has n shares outstanding, the value of the firm is…

$$V_0 = nP_0 = (nD_1 + nP_1)/(1 + k_e)$$

To replace the dividend paid out ($nD_1$), the firm sells m new shares at a price of $P_1$ each…

$$V_0 = [nD_1 + (n + m)P_1 - mP_1]/(1 + k_e)$$

Substituting for $mP_1 = nD_1 + I - X$ in the above expression, we get…

$$V_0 = [(n + m)P_1 - I + X]/(1 + k_e)$$

Note that $D_1$ does not appear in the above equation so dividend policy is irrelevant to firm value

# MM and the Dividend Irrelevance Theory

Illustration:

TXT Ltd has 1,000,000 shares outstanding, and its current market price is $5.00. Assume that the firm operates in a perfect capital market and is considering paying a dividend of $0.50 per share one year from now. The required rate of return on its shares is 10% p.a. and cash from operations is $100,000 while its investment requirement is $500,000

Given:

$P_0$ = \$5.00, $k_e$ =10%, $D_1$ = \$0.50, X = \$100,000 and I = \$500,000

The current total shareholder wealth is…

1000000 × 5.00 = \$5,000,000

# MM and the Dividend Irrelevance Theory

Recall that…

- $P_0 = (D_1 + P_1)/(1 + k_e)$

*Case 1:* If the dividend *is* paid, we have…

- So, $P_1 = P_0(1 + k_e) - D_1$
- $P_1 = 5.00(1.10) - 0.50 = \$5.00$

*Case 2:* If the dividend *is not* paid, we have…

- $D_1 = 0$
- $P_1 = P_0(1 + k_e)$
- $P_1 = 5.00(1.10) = \$5.50$

# MM and the Dividend Irrelevance Theory

Case 1: If the dividend is paid the firm will need to issue new shares in the amount of…

$$mP_1 = nD_1 + I - X$$
$$m(5.00) = 1{,}000{,}000(0.50) + 500{,}000 - 100{,}000$$

$$\text{So, } m = \frac{900{,}000}{5.00} = 180{,}000\ shares$$

Case 2: If the dividend is not paid the firm will need to issue new shares in the amount of…

$$\frac{(Investment\ -\ Cash\ from\ Operations)}{5.50} = 72{,}727\ shares$$

# MM and the Dividend Irrelevance Theory

What happens to shareholder wealth in each case?

Case 1: If the dividend is paid…

Shareholder wealth $= [(1{,}180{,}000)\ (5.00) + 100{,}000 - 500{,}000]/1.10$

$= \$5{,}000{,}000$

Case 2: If the dividend is not paid…

Shareholder wealth $= [(1{,}072{,}727)\ (5.50) + 100{,}000 - 500{,}000]/1.10$

$= \$5{,}000{,}000$

The decision to pay or not pay a dividend does not affect firm value and dividend policy is irrelevant under these assumptions

Is dividend policy really irrelevant in the "real world"?

# Dividends and Taxes

The differential tax treatment of dividend income versus capital gains (arising from retained earnings) can result in shareholders preferring the payment of dividends, or not

We examine this difference in the tax treatment of dividends by comparing a firm's dividend policy under…

A classical tax system
An imputation tax system

# Dividend Policy in a Classical Tax System

Under the classical tax system…

From a dollar of corporate earnings, the shareholder ends up with

$$(1-\tau_C)(1-\tau_P) \text{ dollars of after-personal-tax dividend}$$

That is, dividends are effectively taxed twice

Capital gains are taxed at a lower rate and the effective tax rate on capital gains may even approach zero if share sale are postponed well into the future

Does it make sense for firms to ever pay dividends under the classical tax system?

# Dividend Policy in a Classical Tax System

A classical tax system will tend to lead to the creation of different shareholder "clienteles" depending on their tax rates

Shareholders who pay higher tax on dividends than on capital gains would choose a low dividend paying firm

Shareholders who pay lower tax on dividends than on capital gains would choose a high dividend paying firm

What should the firm do?

Bottom line?
Dividend policy may still be irrelevant via the shareholder clientele effect

# Low Payout Please

Why might a low payout be desirable?

Individuals in upper income tax brackets might prefer lower dividend payouts, with the immediate tax consequences, in favor of higher capital gains

Dividend restrictions: debt contracts might limit the percentage of income that can be paid out as dividends

# High Payout Please

Why might a high payout be desirable?

Desire for current income

Individuals in low tax brackets

Groups that are prohibited from spending principal (trusts and endowments)

Uncertainty resolution: no guarantee that the higher future dividends will materialize

Taxes

Tax-exempt investors don't have to worry about differential treatment between dividends and capital gains

# Imputation and Dividend Policy

Under the imputation tax system…

Earnings distributed as franked dividends to resident shareholders is effectively taxed once at the shareholder's (marginal) personal tax rate

If all a firm's shares were held by resident shareholders with marginal tax rates *less than the corporate tax rate, then the* optimal dividend policy would be to pay dividends and exhaust the available franking credits

However…

Many individuals have personal marginal tax rates that are higher than the corporate tax rate who may prefer the retention of earnings

Not all shareholders are resident shareholders

# Imputation and Dividend Policy

Bottom line?

The interaction of capital gains tax and the imputation tax system means that shareholders with low marginal tax rates would prefer earnings to be paid out as dividends

Those in high marginal tax rates may tend to prefer earnings to be retained
"Imputation clienteles" may exist at the firm level

# Does Dividend Policy Matter?

Probably not a resounding "yes", but a qualified "yes"…

Markets are not perfect and market imperfections drive managers to pay attention to do "what the market wants"

Taxes are the obvious market imperfection but in some cases the irrelevance of dividend policy may still hold
The classical tax system versus the imputation tax system

Dividends do contain information and possess strong "signaling" elements as well

Dividends also result in lowering the agency costs between management and shareholders

# Clientele Effect

Some investors prefer low dividend payouts and will buy stock in those companies that offer low dividend payouts

Some investors prefer high dividend payouts and will buy stock in those companies that offer high dividend payouts

Implications

What do you think will happen if a firm changes its policy from a high payout to a low payout?

What do you think will happen if a firm changes its policy from a low payout to a high payout?

If this is the case, does dividend POLICY matter?

# Information Content of Dividends

Stock prices generally rise with unexpected increases in dividends and fall with unexpected decreases in dividends

The stock market reacts positively to dividend increases and negatively to decreases or cuts.

Empirical evidence shows that tax increases lead to higher payouts, rather than lower.

# Dividend Policy in Practice

Residual dividend policy

Constant growth dividend policy – dividends increased at a constant rate each year

Constant payout ratio: pay a constant percent of earnings each year

Compromise dividend policy

# Residual Dividend Policy

Determine capital budget

Determine target capital structure

Finance investments with a combination of debt and equity in line with the target capital structure

Remember that retained earnings are equity

If additional equity is needed, issue new shares

If there are excess earnings, then pay the remainder out in dividends

# Example – Residual Dividend Policy

Given

Need $5 million for new investments

Target capital structure: D/E = 2/3

Net Income = $4 million

Finding dividend

40% financed with debt (2 million)

60% financed with equity (3 million)

Net Income – equity financing = $1 million, paid out as dividends

# Compromise Dividend Policy

Goals, ranked in order of importance

Avoid cutting back on positive NPV projects to pay a dividend

Avoid dividend cuts

Avoid the need to sell equity

Maintain a target debt/equity ratio

Maintain a target dividend payout ratio

Companies want to accept positive NPV projects, while avoiding negative signals

# Stock Repurchase

Company buys back its own shares of stock

Tender offer: company states a purchase price and a desired number of shares

Open market: buys stock in the open market

Similar to a cash dividend in that it returns cash from the firm to the stockholders

This is another argument for dividend policy irrelevance in the absence of taxes or other imperfections

# Real-World Considerations

Stock repurchase allows investors to decide if they want the current cash flow and associated tax consequences

Investors face capital gains taxes instead of ordinary income taxes (lower rate)

In our current tax structure, repurchases may be more desirable due to the options provided stockholders

# Information Content of Stock Repurchases

Stock repurchases sends a positive signal that management believes that the current price is low

Tender offers send a more positive signal than open market repurchases because the company is stating a specific price

The stock price often increases when repurchases are announced

# Stock Repurchase Announcement

"America West Airlines announced that its Board of Directors has authorized the purchase of up to 2.5 million shares of its Class B common stock on the open market as circumstances warrant over the next two years …

"Following the approval of the stock repurchase program by the company's Board of Directors earlier today. W. A. Franke, chairman and chief officer said 'The stock repurchase program reflects our belief that America West stock may be an attractive investment opportunity for the Company, and it underscores our commitment to enhancing long-term shareholder value.'

"The shares will be repurchased with cash on hand, but only if and to the extent the Company holds unrestricted cash in excess of $200 million to ensure that an adequate level of cash and cash equivalents is maintained."

# Stock Dividends

Pay additional shares of stock instead of cash

Increases the number of outstanding shares

Small stock dividend
Less than 20 to 25%
If you own 100 shares and the company declared a 10% stock dividend, you would receive an additional 10 shares

Large stock dividend: more than 20 to 25%

# Stock Splits

Stock splits: essentially the same as a stock dividend except expressed as a ratio

For example, a 2 for 1 stock split is the same as a 100% stock dividend

It is often claimed that stock splits, in and of themselves, lead to higher stock prices; research, however, does not bear this out. What is true is that stock splits are usually initiated after a large run up in share price

Common explanation for split is to return price to a "more desirable trading range"

# Key Concepts

Dividend policy is about the trade-off between retaining profit and paying out dividends

Dividend policy does not affect shareholders' wealth in a perfect capital market

Dividend policy becomes important when we consider taxes and other market imperfections

The imputation tax system does eliminate double taxing of dividend income and encourages higher dividend payout ratios