



LISBON
SCHOOL OF
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Corporate Investment Appraisal

Masters in Finance

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Problem Set 8: Capital Structure: Personal Taxes, Costs of Financial Distress, Agency Problems, Asymmetric Information TO CHECK AT HOME

1. Personal Taxes

Markum Enterprises considers a permanent increase in its debt of \$100 million. The tax rate on Markum's income is 35%.

- Without considering personal taxes, what is the present value of the interest tax shield of the new debt?
- If investors pay a tax rate of 40% on income from bonds and a tax rate of 20% on income from shares (dividends and capital gains), what is the present value of the interest tax shield?

2. Trade-off Theory: Interest Tax Shield and Financial Distress Costs

Suppose that your company considers issuing debt with maturity of 1 year, having reached the following estimates of interest tax shield and probability of financial distress for different levels of debt:

	Debt Level (\$ million)						
	0	40	50	60	70	80	90
PV (interest tax shield, \$ million)	0.00	0.76	0.95	1.14	1.33	1.52	1.71
Probability of Financial Distress	0%	0%	1%	2%	7%	16%	31%

Suppose the company has a beta equal to zero, which justifies discounting the costs of financial distress at a risk-free rate of 5%. What is the optimal level of debt, assuming a loss of \$5 million when financial distress occurs?

3. Agency Costs of Debt

Zymase is a start-up in the biotechnology industry. Zymase researchers must choose one of three research strategies. The (after tax) payoffs and their probabilities are described in the following table. Each project's risk is diversifiable.

Strategy	Probability	Payoff (\$ million)
A	100%	75
B	50%	140
	50%	0
C	10%	300
	90%	40

- Which project has the highest expected payoff?
- Suppose Zymase has debt of \$40 million maturing when the payoff is realized. Which project has the highest expected payoff from the point of view of the shareholders?
- Suppose now that Zymase has debt of \$110 million. Which project has the highest expected payoff from the shareholders' point of view?
- If the company chooses the strategy preferred by its shareholders, what is the agency cost of having debt of \$40 million? And the value of this cost if debt were \$110 million?

4. Asymmetric Information: Pecking order theory

WRT considers expanding into new geographic areas. Expansion implies the same business risk that the firm currently has. The expansion implies an initial investment of \$50 million and is expected to generate a perpetual annual EBIT of \$20 million. After the initial investment, capex will be equal to depreciation and we expect no changes in net working capital.

WRT's capital structure currently corresponds to \$500 million equity and \$300 million debt (market values), for a total of 10 million shares outstanding. The unlevered cost of capital of WRT is 10%, and debt is riskless, with a cost of 4%. The tax rate on corporate income is 35%, and there are no personal taxes.

- Initially WRT proposes to finance the expansion with an equity offering. If, before, shareholders did not anticipate this expansion, and if they share the corporation's expectations about the profitability of this project, what is the expected share price after the announcement?

- b. Suppose now that investors think that the annual EBIT associated with the expansion would be only \$4 million. What would the share price be in this case? What number of shares would WRT have to issue?
- c. Suppose WRT issues shares as described in part b. A little after the issue, new data arrives that convinces investors that WRT's managers were initially right in the projection of annual EBIT equal to \$20 million. What is the new share price? Compare it to the price in part a.
- d. Suppose that, in the end, WRT decides to finance the project with an issuance of \$50 million risk-free debt. What is the share price in this case? What is the advantage of issuing debt in these circumstances?