

Mid-term Exam II

Review of Modules 4–6

FINE 3010, Financial Management
Prof. Renping Li, Tulane University

Mid-term Exam II

- Monday 10/26, in class, 50 minutes, 100 points, covers **Modules 4–6** only
- Questions 1–10 multiple choice (6 points each), Questions 11–12 free response (20 points each)
- Show your work on free response, partial credit for correct steps
- Formula sheet provided, plus your **financial calculator** and one self-prepared cheat sheet (one page, double-sided, A4)

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- **Present value**, the value today of a future cash flow, $PV = FV / (1 + r)^T$

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- 1 **PV**, 6 **I/Y**, 0 **PMT**, 2 **FV**, then **CPT** **N**

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$$N = ?, \quad I = 6\%$$

- 1 **PV**, 6 **I/Y**, 0 **PMT**, 2 **FV**, then **CPT** **N**
- The output is 11.9, about 11.9 years, because $(1 + 0.06)^{11.9} \approx 2$

Recap, Three Kinds of Returns

Return

Percentage growth of an asset's value over some period of time

Holding period return

Percentage growth over the whole period an asset is owned, longer or shorter than a year

Annualized return

Percentage growth per year, a geometric mean over the T years of the holding period

Module 4, Holding Period and Annualized Returns

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- E.g., a stock returns 80% in the first year and -20% in the second year
 - Holding period return, $1.80 \times 0.80 - 1 = 44\%$

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- E.g., a stock returns 80% in the first year and -20% in the second year
 - Holding period return, $1.80 \times 0.80 - 1 = 44\%$
 - Annualized return, $1.44^{1/2} - 1 = 20\%$, *not* $(80\% - 20\%)/2 = 30\%$

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- Your financial calculator is programmed to solve this equation

$$PV + \left[\frac{PMT}{(1+I)^1} + \frac{PMT}{(1+I)^2} \cdots + \frac{PMT}{(1+I)^N} \right] + \frac{FV}{(1+I)^N} = 0$$

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- Set the number of compounding periods per year to 1, and show at least 4 digits

Set the Number of Digits to at Least 4!

- On the TI BA II Plus, press
 - **2nd**
 - **.**
 - **4**
 - **ENTER**

Set the Number of Compounding Periods per Year to 1!

- On the TI BA II Plus, press
 - **2nd**
 - **I/Y** (**P/Y**)
 - 1
 - **ENTER**

Set the Number of Compounding Periods per Year to 1!

- On the TI BA II Plus, press
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 - **ENTER**

You must do this!

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$$PV \text{ of annuity} = C \times \frac{1}{r} \left(1 - \frac{1}{(1 + r)^N} \right)$$

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- On the calculator, N **N**, r **I/Y**, C **PMT**, 0 **FV**, then **CPT** **PV**
- Timing, the first payment is at $t = 1$. Due (first payment at $t = 0$), multiply by $(1 + r)$. Delayed (first payment at $t > 1$), multiply by $1/(1 + r)^{t-1}$

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$$(1 + \text{Real return}) = \frac{(1 + \text{Nominal return})}{(1 + \text{Inflation rate})}$$

Approximation, $\text{Real return} \approx \text{Nominal return} - \text{Inflation rate}$

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Approximation, $\text{Real return} \approx \text{Nominal return} - \text{Inflation rate}$

- E.g., a nominal return of 6% and an inflation rate of 2%, real return = $1.06/1.02 - 1 = 3.9\%$, approximately $6\% - 2\% = 4\%$

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- **Bond value**, the present value of the coupons and the face value, discounted at the required rate of return r

$$\text{Value} = \frac{\text{Coupon}}{(1+r)^1} + \frac{\text{Coupon}}{(1+r)^2} + \dots + \frac{\text{Coupon} + \text{Face value}}{(1+r)^T}$$

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- On the calculator, T **N**, r **I/Y**, coupon **PMT**, face value **FV**, then **CPT** **PV**

Required Rate of Return vs. Yield

Required rate of return r

- The discount rate for computing the bond's value
- Chosen by investors as the opportunity cost, the return on alternatives with a similar risk
- Input r , output the value
(**CPT** **PV**)

Yield y

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Yield y

- The discount rate for which the present value of the payments equals the price
- Implied by the market price
- Input the price, output the yield
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Required Rate of Return vs. Yield

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- The discount rate for computing the bond's value
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- Input r , output the value
(**CPT** **PV**)
- **Subjective**

Yield y

- The discount rate for which the present value of the payments equals the price
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- **Objective**

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- Credit ratings capture default risk, investment-grade (Baa or BBB and higher) against high-yield (“junk”) bonds, lower-rated bonds carry higher yields and lower prices

Module 5, Stock Valuation, Dividend Discount Model

- Stock value, the present value of the expected dividends, discounted at the required return on equity r_e

$$P = \frac{\text{Div}_1}{(1 + r_e)^1} + \frac{\text{Div}_2}{(1 + r_e)^2} + \frac{\text{Div}_3}{(1 + r_e)^3} + \dots$$

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- **Earnings per share (EPS)** = Net income / Number of shares outstanding. **P/E ratio** = Stock price / EPS

Example, Valuing Non-Constant Growth

Recall from **Modules 5 and 6**

- A stock's expected dividends are in the table. Its required return on equity is 10%. Its dividends grow at 5% a year beginning in year 6. What is the value of the stock?

Year	1	2	3	4	5
Dividend	\$2	\$2	\$2	\$3	\$3

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- We discounted the year-5 price of the constant-growth stream, then the five dividends, term by term,

$$PV_{\text{Price in year 5}} = \frac{3 \times 1.05}{0.10 - 0.05} \times \frac{1}{1.10^5} = \$39.12$$

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$$PV_{\text{Dividends 1-5}} = \frac{2}{1.10} + \frac{2}{1.10^2} + \frac{2}{1.10^3} + \frac{3}{1.10^4} + \frac{3}{1.10^5} = \$8.89$$

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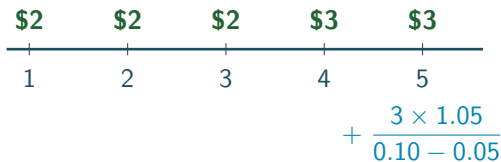
- Total, $PV_{\text{Stock}} = 39.12 + 8.89 = \$48.00$

Example, Non-Constant Growth with a Financial Calculator

\$2	\$2	\$2	\$3	\$3
1	2	3	4	5

$$+ \frac{3 \times 1.05}{0.10 - 0.05}$$

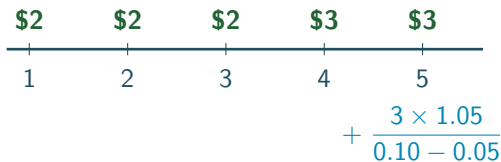
Example, Non-Constant Growth with a Financial Calculator



- Enter the cash flows one by one, 0, 2, 2, 2, 3, 66
- In year 5, enter the dividend plus the price, $3 + 63 = 66$

Enter	Keys
	CF, 2nd, CLR Work
0	ENTER, ↓
2	ENTER, ↓, ↓
2	ENTER, ↓, ↓
2	ENTER, ↓, ↓
3	ENTER, ↓, ↓
66	ENTER
	NPV (the calculator asks for I)
10	ENTER, ↓
	CPT
<u>48.00</u>	

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- In year 5, enter the dividend plus the price, $3 + 63 = 66$
- No need to discount each cash flow and sum by hand!**

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- On the calculator, the same worksheet with -50 entered as the first cash flow (instead of 0)

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- The estimate is sensitive to the choice of multiple, and good comparables are hard to find

Module 6, Net Present Value

- **Net present value (NPV)**, $NPV = PV(\text{Benefits}) - PV(\text{Costs})$

$$NPV = CF_0 + \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \cdots + \frac{CF_T}{(1+r)^T}$$

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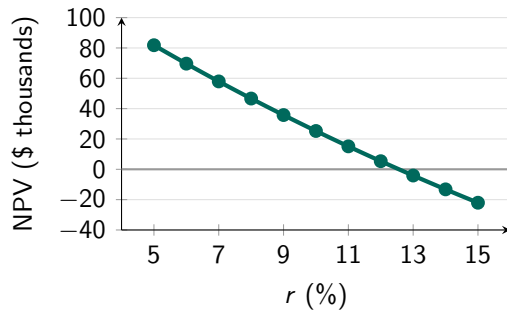
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- Discount at r , the **opportunity cost**, the return you could earn on a different project (or a financial asset) with similar risk
- **NPV rule**, take all decisions with $NPV > 0$, reject all decisions with $NPV < 0$. Accepting a project with an NPV of x changes shareholder value by x

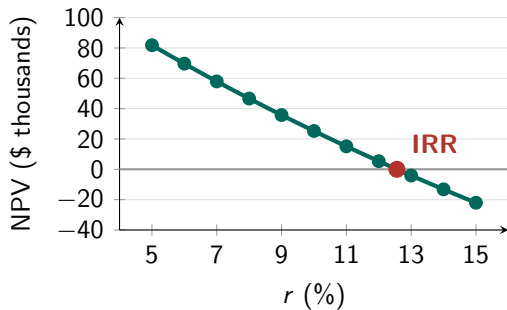
Module 6, Internal Rate of Return

- **NPV profile**, the NPV against r , typically downward sloping



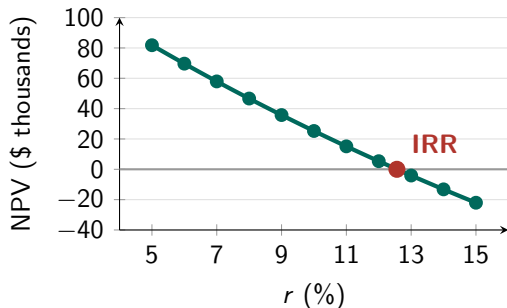
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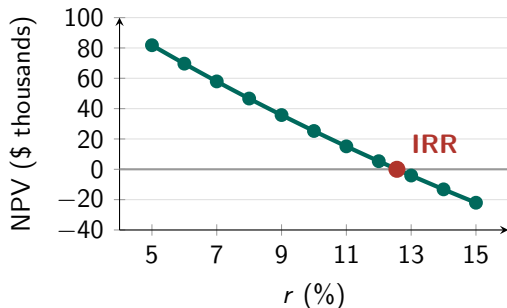
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- **IRR rule**, accept if $IRR >$ opportunity cost r , reject if $IRR < r$
- Cash flows that change sign more than once can have multiple IRRs, when the rules disagree, trust the NPV rule



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- **Limited dollars**, rank projects by their profitability index from highest to lowest and go down the ranking

$$\text{Profitability index} = \frac{\text{Net present value}}{\text{Initial investment}}$$

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- **Mutually exclusive projects** (you can only choose one), among the positive-NPV projects take the one with the highest NPV
- Not the highest IRR, the IRR ignores the size of a project, NPV captures dollars and IRR captures percentage returns
- **Limited dollars**, rank projects by their profitability index from highest to lowest and go down the ranking

$$\text{Profitability index} = \frac{\text{Net present value}}{\text{Initial investment}}$$

- Stop when you run out of dollars or run out of positive-NPV projects

Module 6, Payback Period and Payback Rule

- **Payback period**, the number of years until the cash flows recover the initial investment

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- **Payback period**, the number of years until the cash flows recover the initial investment
- **Payback rule**, accept if the payback period is shorter than a maximum cutoff
- Easy to compute, but no discounting, every cash flow after the cutoff is ignored, and the cutoff is arbitrary, so it can rank projects wrongly

Capital Budgeting Techniques, Summary

Criterion	Definition	Investment rule
Net present value (NPV)	Present value of benefits minus present value of costs	Take all projects with $NPV > 0$, reject all with $NPV < 0$
Internal rate of return (IRR)	The discount rate at which $NPV = 0$	Accept if $IRR > \text{opportunity cost } r$, reject if $IRR < r$
Profitability index	Net present value divided by initial investment	Under capital rationing, rank projects by their profitability index and go down the ranking
Payback period	The number of years until the cash flows recover the initial investment	Accept if the payback period is shorter than a maximum cutoff

Thank you!

Please let me know if you have any questions.