Week 4

Financial Planning

- Determine your objective growth
- Mostly market conditions along with your operational and financial capabilities will be instrumental
- Determine what increase you need in your assets to achieve your objective
- Figure out the funding

Income Statement		Balance Sheet			
Sales	$1,000	Assets	$500	Debt	$250
Costs	800			Equity	250
Net income	$ 200	Total	$500	Total	$500

Pro Forma Income Statement

Sales	$1,200
Costs	960
Net income	$ 240

Pro Forma Balance Sheet

Assets	$600 (+100)	Debt	$300	(+50)
		Equity	300	(+50)
Total	$600 (+100)	Total	$600	(+100)

Income Statement		Balance Sheet			
Sales	$1,000	Assets	$500	Debt	$250
Costs	800			Equity	250
Net income	$ 200	Total	$500	Total	$500

Pro Forma Income Statement

Sales	$1,200
Costs	960
Net income	$ 240

Pro Forma Balance Sheet

Assets	$600 (+100)	Debt	$110	(−140)
		Equity	490	(+240)
Total	$600 (+100)	Total	$600	(+100)

Income Statement		
Sales		$1,000
Costs		800
Taxable income		$ 200
Taxes (34%)		68
Net income		$ 132
Dividends	$44	
Addition to retained earnings	88	

Pro Forma Income Statement	
Sales (projected)	$1,250
Costs (80% of sales)	1,000
Taxable income	$ 250
Taxes (34%)	85
Net income	$ 165

Balance Sheet

Assets	$	Percentage of Sales	Liabilities and Owners' Equity	$	Percentage of Sales
Current assets			Current liabilities		
Cash	$ 160	16%	Accounts payable	$ 300	30%
Accounts receivable	440	44	Notes payable	100	n/a
Inventory	600	60	Total	$ 400	n/a
Total	$1,200	120	Long-term debt	$ 800	n/a
Fixed assets			Owners' equity		
Net plant and equipment	$1,800	180	Common stock and paid-in surplus	$ 800	n/a
			Retained earnings	1,000	n/a
			Total	$1,800	n/a
Total assets	$3,000	300%	Total liabilities and owners' equity	$3,000	n/a

Partial Pro Forma Balance Sheet

Assets			Liabilities and Owners' Equity		
	Next Year	Change from Current Year		Next Year	Change from Current Year
Current assets			Current liabilities		
Cash	$ 200	$ 40	Accounts payable	$ 375	$ 75
Accounts receivable	550	110	Notes payable	100	0
Inventory	750	150	Total	$ 475	$ 75
Total	$1,500	$300	Long-term debt	$ 800	$ 0
Fixed assets			Owners' equity		
Net plant and equipment	$2,250	$450	Common stock and paid-in surplus	$ 800	$ 0
			Retained earnings	1,110	110
			Total	$1,910	$110
Total assets	$3,750	$750	Total liabilities and owners' equity	$3,185	$185
			External financing needed	$ 565	$565

Assumption: Keep the NWC the same as before

Pro Forma Balance Sheet

Assets	Next Year	Change from Current Year	Liabilities and Owners' Equity	Next Year	Change from Current Year
Current assets			Current liabilities		
Cash	$ 200	$ 40	Accounts payable	$ 375	$ 75
Accounts receivable	550	110	Notes payable	325	225
Inventory	750	150	Total	$ 700	$300
Total	$1,500	$300	Long-term debt	$1,140	$340
Fixed assets			Owners' equity		
Net plant and equipment	$2,250	$450	Common stock and paid-in surplus	$ 800	$ 0
			Retained earnings	1,110	110
			Total	$1,910	$110
Total assets	$3,750	$750	Total liabilities and owners' equity	$3,750	$750

Assumption: Increase the NWC at the same rate as sales

Partial Pro Forma Balance Sheet

Assets	Next Year	Change from Current Year	Liabilities and Owners' Equity	Next Year	
Current assets			Current liabilities		
Cash	$ 200	$ 40	Accounts payable	$ 375	
Accounts receivable	550	110	Notes payable	100	
Inventory	750	150	Total	$ 475	← 500
Total	$1,500	$300	Long-term debt	$ 800	← 1,340
Fixed assets			Owners' equity		
Net plant and equipment	$2,250	$450	Common stock and paid-in surplus	$ 800	
			Retained earnings	1,110	
			Total	$1,910	
Total assets	$3,750	$750	Total liabilities and owners' equity	$3,185	
			External financing needed	$ 565	

Percent of Sales and EFN

- External Financing Needed (EFN) can also be calculated as:

$$\left(\frac{\text{Assets}}{\text{Sales}}\right)\times\Delta\text{Sales}-\frac{\text{Spon Liab}}{\text{Sales}}\times\Delta\text{Sales}-(PM\times\text{Projected Sales})\times(1-d)$$

$$=(3\times 250)-(0.3\times 250)-(0.13\times 1250\times 0.667)$$

$$=\$565$$

3.5 External Financing and Growth

- At low growth levels, internal financing (retained earnings) may exceed the required investment in assets.
- As the growth rate increases, the internal financing will not be enough, and the firm will have to go to the capital markets for financing.
- Examining the relationship between growth and external financing required is a useful tool in financial planning.

HOFFMAN COMPANY
Income Statement and Balance Sheet

Income Statement

Sales		$500
Costs		400
Taxable income		$100
Taxes (34%)		34
Net income		$ 66
Dividends	$22	
Addition to retained earnings	44	

Balance Sheet

Assets	$	Percentage of Sales	Liabilities and Owners' Equity	$	Percentage of Sales
Current assets	$200	40%	Total debt	$250	n/a
Net fixed assets	300	60	Owners' equity	250	n/a
Total assets	$500	100%	Total liabilities and owners' equity	$500	n/a

HOFFMAN COMPANY
Pro Forma Income Statement and Balance Sheet

Income Statement

Sales (projected)		$600.0
Costs (80% of sales)		480.0
Taxable income		$120.0
Taxes (34%)		40.8
Net income		$ 79.2
Dividends	$26.4	
Addition to retained earnings	52.8	

Balance Sheet

Assets

	$	Percentage of Sales
Current assets	$240.0	40%
Net fixed assets	360.0	60
Total assets	$600.0	100%

Liabilities and Owners' Equity

	$	Percentage of Sales
Total debt	$250.0	n/a
Owners' equity	302.8	n/a
Total liabilities and owners' equity	$552.8	n/a
External financing needed	$ 47.2	n/a

Projected Sales Growth	Increase in Assets Required	Addition to Retained Earnings	External Financing Needed, EFN	Projected Debt–Equity Ratio
0%	$ 0	$44.0	–$44.0	.70
5	25	46.2	–21.2	.77
10	50	48.4	1.6	.84
15	75	50.6	24.4	.91
20	100	52.8	47.2	.98
25	125	55.0	70.0	1.05

Onlinepoll

Why would an investor choose to invest on low profit margin(PM) company?

A) ROE may be high even though PM is low. 1

B) Current earnings may not be reflective of future earning potential 0

C) Days' Sales in inventory may be high 7

D) A and B 153

Onlinepoll

Why does the (Change in RE) line starts at a positive number?

A) ROE may be high even though PM is low. 1

B) Current earnings may not be reflective of future earning potential 0

C) Days' Sales in inventory may be high 7

D) A and B 153

$$\left(\frac{\text{Assets}}{\text{Sales}}\right) \times \Delta\text{Sales} - \frac{\text{Spon Liab}}{\text{Sales}} \times \Delta\text{Sales} - (PM \times \text{Projected Sales}) \times (1 - d)$$

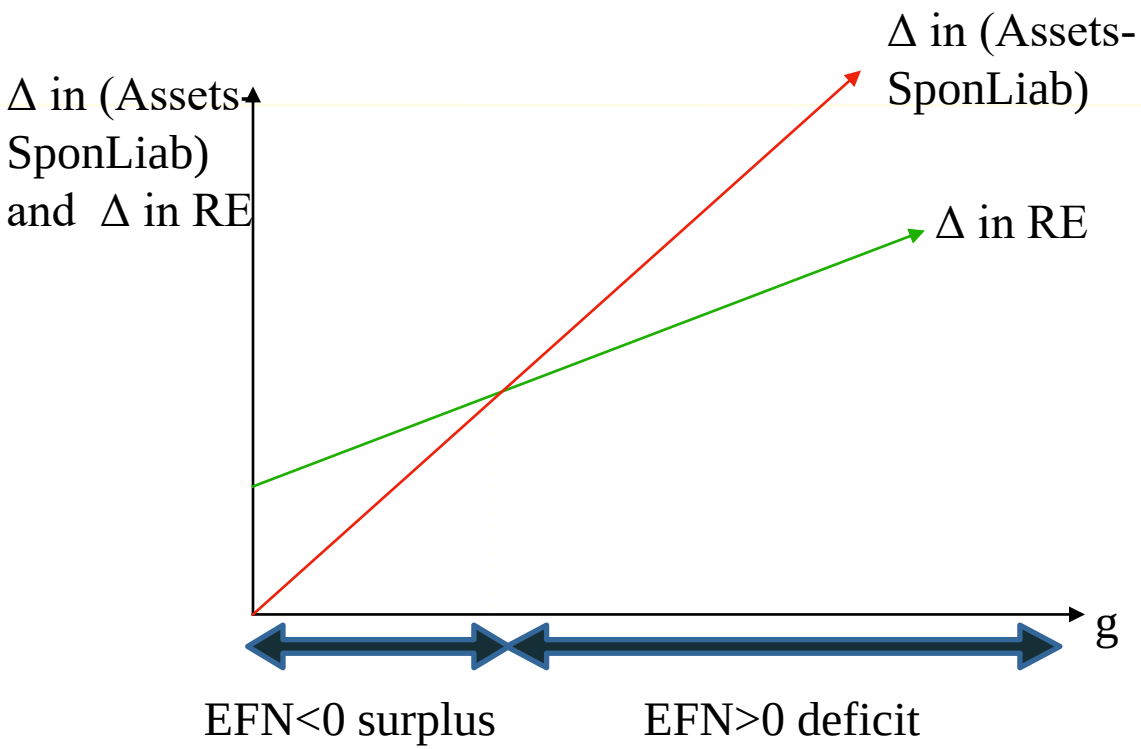
The Internal Growth Rate

- The internal growth rate tells us how much the firm can grow assets using retained earnings as the only source of financing.
- Using the information from the Hoffman Co.
  - ROA = 66 / 500 = .132
  - b = 44/ 66 = .667

$$\text{Internal Growth Rate} = \frac{ROA \times b}{1 - ROA \times b}$$

$$= \frac{.132 \times .667}{1 - .132 \times .667} = .0965$$

$$= 9.65\%$$


Δ in (Assets-SponLiab)
Δ in (Assets-SponLiab) and Δ in RE
Δ in RE
g
EFN<0 surplus
EFN>0 deficit

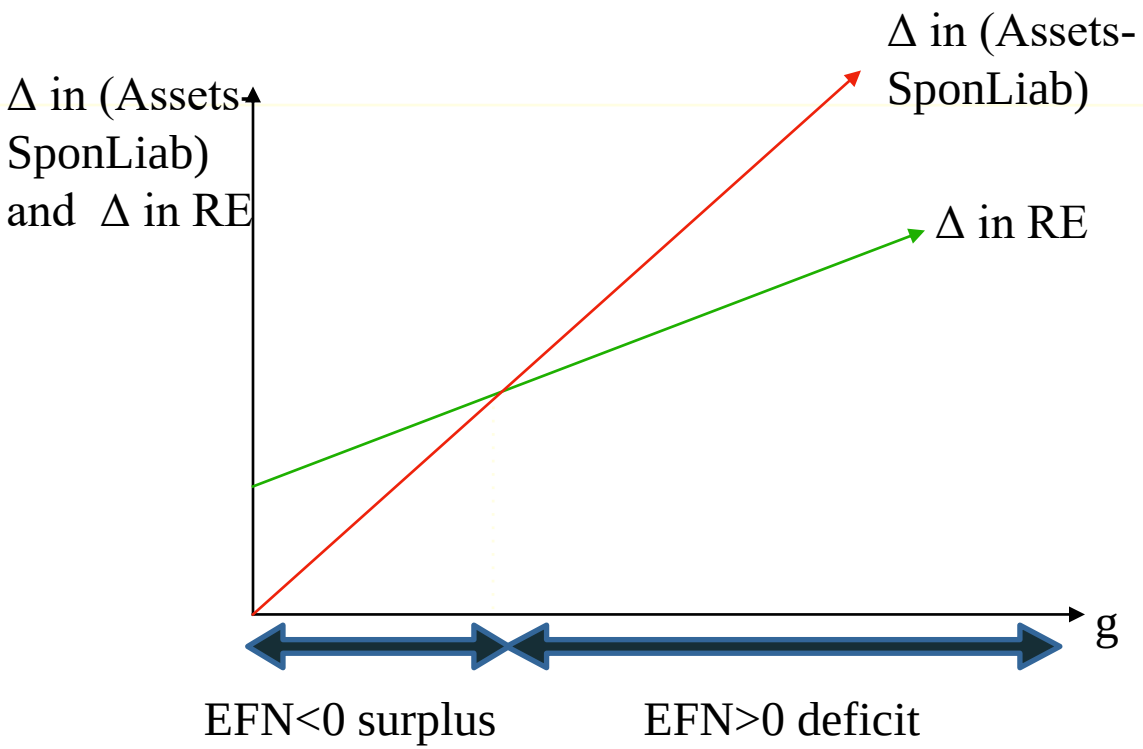
Onlinepoll

- 111S20Q12
- pw: igr

The Sustainable Growth Rate

- The sustainable growth rate tells us how much the firm can grow by using internally generated funds and issuing debt to maintain a constant debt ratio.
- Using the Hoffman Co.
  - ROE = 66 / 250 = .264
  - b = .667

$$\text{Sustainable Growth Rate} = \frac{ROE \times b}{1 - ROE \times b}$$
$$= \frac{.264 \times .667}{1 - .264 \times .667} = .214$$
$$= 21.4\%$$


Δ in (Assets-SponLiab)
Δ in (Assets-SponLiab) and Δ in RE
Δ in RE
g
EFN<0 surplus
EFN>0 deficit

Onlinepoll

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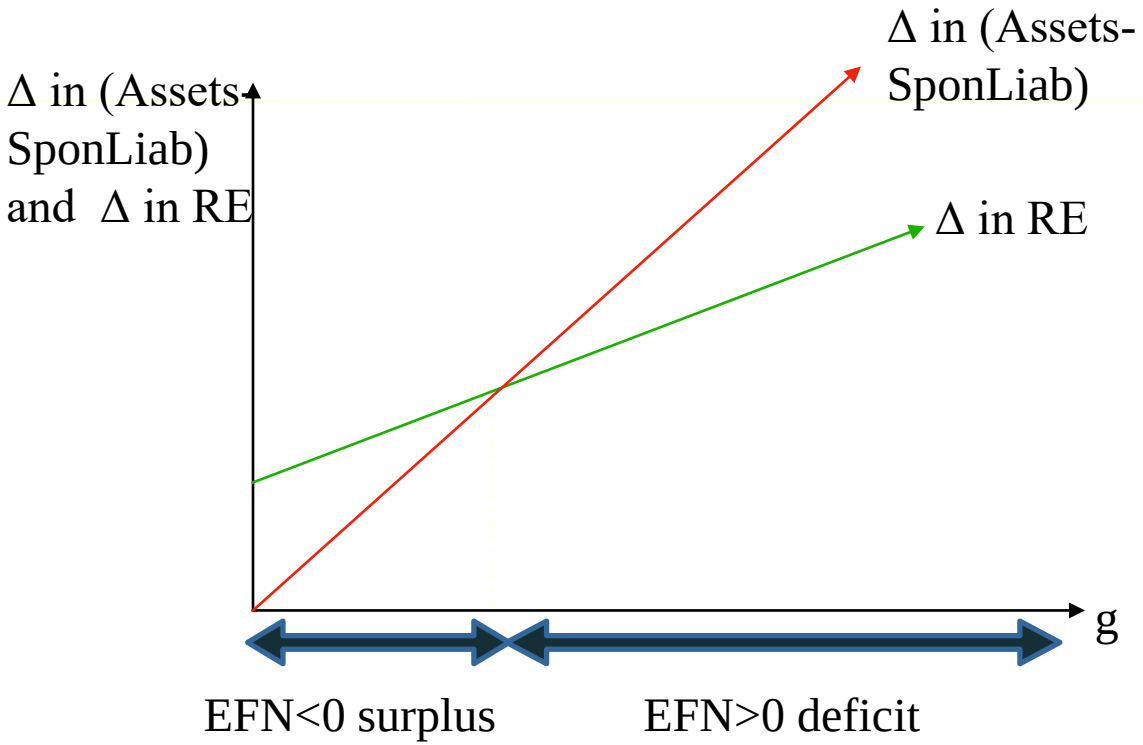
- pw: sgr

Relationship between growth rate and EFN



Two things to note:

1. Note that Δ in (Assets-SponLiab) starts at the origin. If the company does not grow (g=0%) there is no need to increase assets or change spontaneous liabilities. (Per year, sales will take place as before, existing assets will be used and depreciation amount, which is taken off as cost, can be used to replace the depreciating asset. Δ in RE starts at a positive value. Note that if the company does not grow, it will still have revenue, albeit as before. Hence, if company had positive profit and kept some of it as RE, without any growth, the same amount of revenue and Δ in RE will be obtained.
2. There is a differential in the slopes of two lines which allows a unique intersection and the existence of IGR. The Slope of the red line is equal to Δ in Assets-SponLiab per percentage growth rate. The slope of the green line is equal to Δ in RE per percentage growth rate. Since assets are expected to be used over time, it is reasonable to expect the sales to be smaller and profit and addition to RE even smaller than assets.

Determinants of Growth

- Profit margin – operating efficiency
- Total asset turnover – asset use efficiency
- Financial leverage – choice of optimal debt ratio
- Dividend policy – choice of how much to pay to shareholders versus reinvesting in the firm

3.6 Some Caveats

- Financial planning models do not indicate which financial polices are the best.
- Models are simplifications of reality, and the world can change in unexpected ways.
- Without some sort of plan, the firm may find itself adrift in a sea of change without a rudder for guidance.

Chapter 4

Discounted Cash Flow Valuation

4.1 The One-Period Case

- If you were to invest $10,000 at 5-percent interest for one year, your investment would grow to $10,500.

  $500 would be interest ($10,000 × .05)

$10,000 is the principal repayment ($10,000 × 1)

$10,500 is the total due. It can be calculated as:

$10,500 = $10,000×(1.05)

- The total amount due at the end of the investment is call the *Future Value* (*FV*).

Future Value

- In the one-period case, the formula for *FV* can be written as:

$$FV = C_0 \times (1 + r)$$

Where C_0 is cash flow today (time zero), and
r is the appropriate interest rate.

Present Value

- If you were to be promised $10,000 due in one year when interest rates are 5-percent, your investment would be worth $9,523.81 in today's dollars.

$$\$9{,}523.81 = \frac{\$10{,}000}{1.05}$$

The amount that a borrower would need to set aside today to be able to meet the promised payment of $10,000 in one year is called the *Present Value* (*PV*).

Note that $10,000 = $9,523.81×(1.05).

Present Value

- In the one-period case, the formula for *PV* can be written as

$$PV = \frac{C_1}{1+r}$$

Where C_1 is cash flow at date 1, and

r is the appropriate interest rate.

Net Present Value

- The Net Present Value (*NPV*) of an investment is the present value of the expected cash flows, less the cost of the investment.
- Suppose an investment that promises to pay $10,000 in one year is offered for sale for $9,500. Your interest rate is 5%. Should you buy?

Net Present Value

$$NPV = -\$9{,}500 + \frac{\$10{,}000}{1.05}$$

$$NPV = -\$9{,}500 + \$9{,}523.81$$

$$NPV = \$23.81$$

The present value of the cash inflow is greater than the cost. In other words, the Net Present Value is positive, so the investment should be purchased.

Net Present Value

In the one-period case, the formula for *NPV* can be written as:

- $NPV = -Cost + PV$

If we had *not* undertaken the positive *NPV* project considered on the last slide, and instead invested our $9,500 elsewhere at 5 percent, our *FV* would be less than the $10,000 the investment promised, and we would be worse off in *FV* terms :

$\$9{,}500 \times (1.05) = \$9{,}975 < \$10{,}000$

4.2 The Multiperiod Case

- The general formula for the future value of an investment over many periods can be written as:

$$FV = C_0 \times (1 + r)^T$$

Where

C_0 is cash flow at date 0,

r is the appropriate interest rate, and

T is the number of periods over which the cash is invested.

Future Value

- Suppose a stock currently pays a dividend of $1.10, which is expected to grow at 40% per year for the next five years.
- What will the dividend be in five years?

$$FV = C_0 \times (1 + r)^T$$

$$\$5.92 = \$1.10 \times (1.40)^5$$

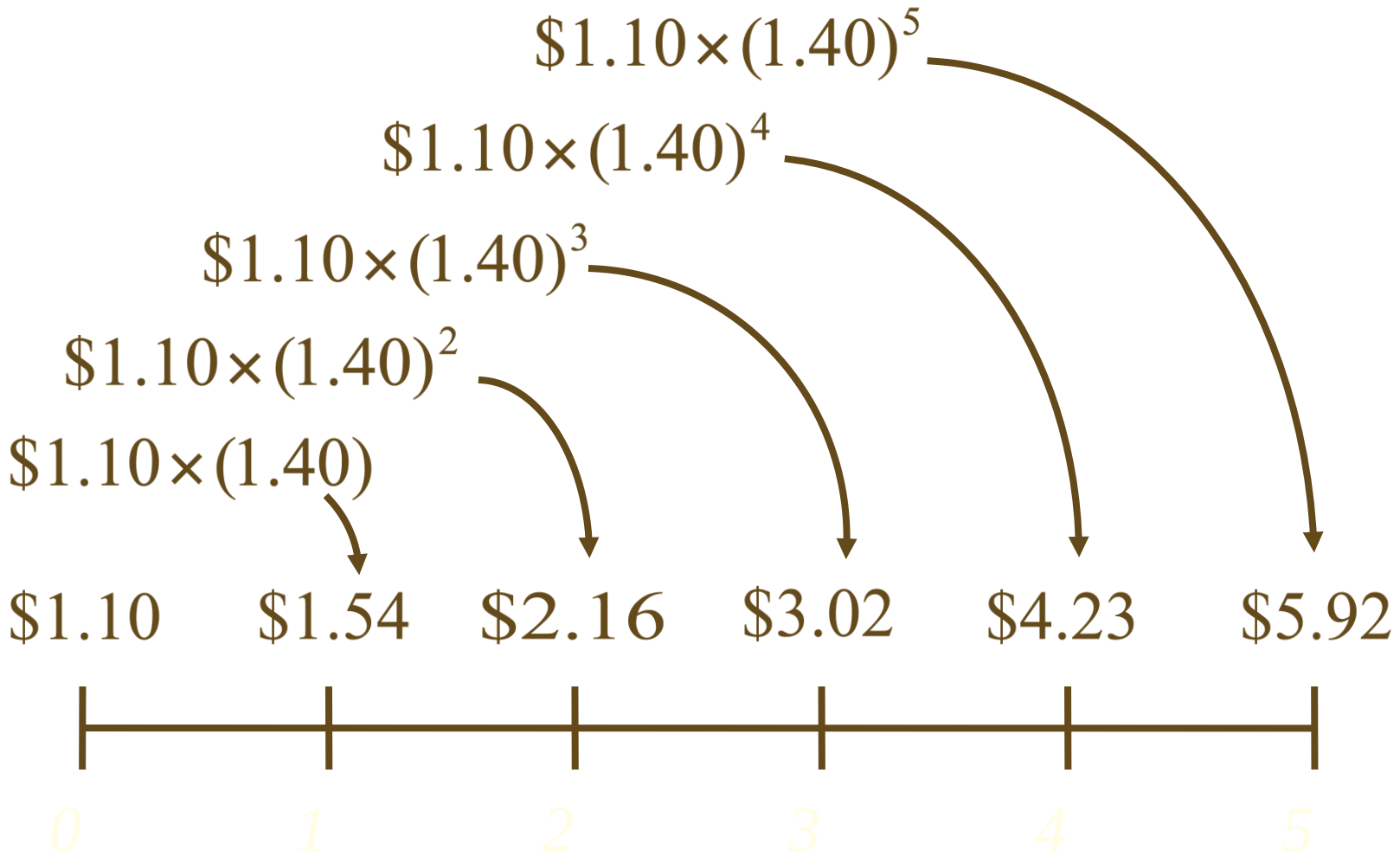
Future Value and Compounding

- Notice that the dividend in year five, $5.92, is considerably higher than the sum of the original dividend plus five increases of 40-percent on the original $1.10 dividend:

$5.92 > $1.10 + 5×[$1.10×.40] = $3.30

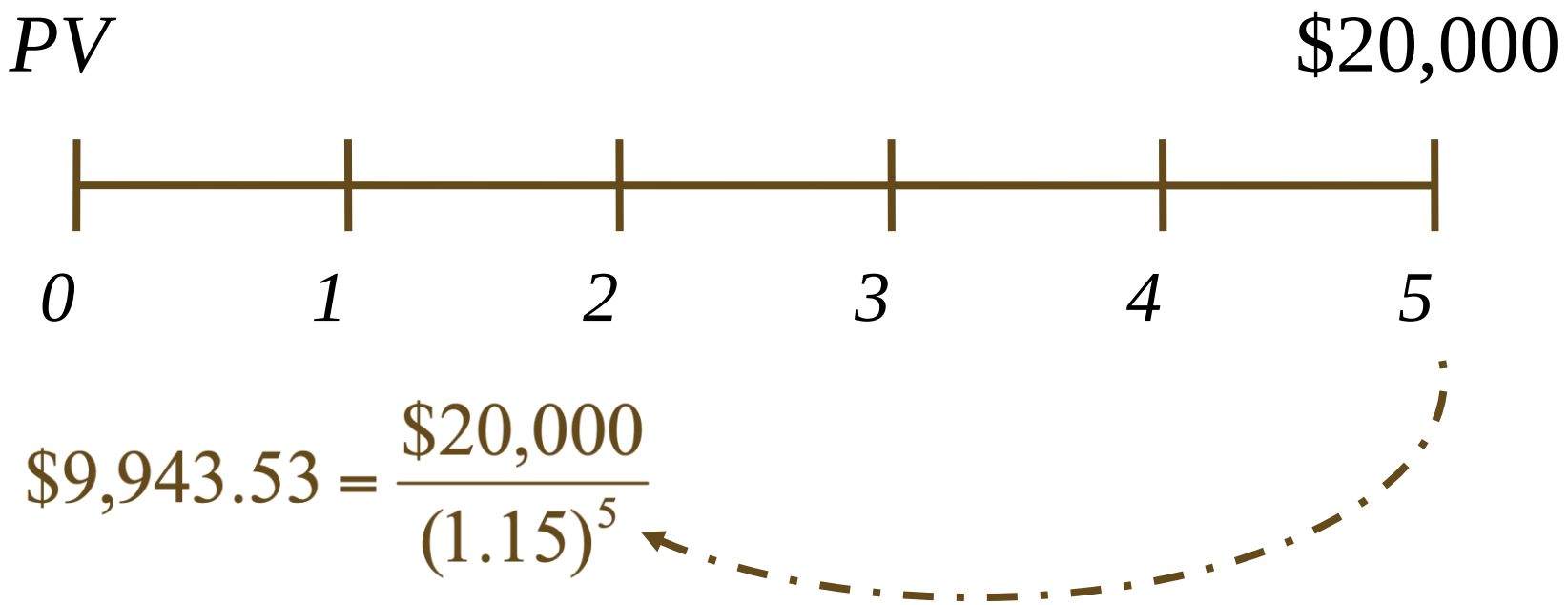
This is due to *compounding*.

Future Value and Compounding



Present Value and Discounting

- How much would an investor have to set aside today in order to have $20,000 five years from now if the current rate is 15%?



4.5 Finding the Number of Periods

If we deposit $5,000 today in an account paying 10%, how long does it take to grow to $10,000?

$$FV = C_0 \times (1+r)^T \qquad \$10{,}000 = \$5{,}000 \times (1.10)^T$$

$$(1.10)^T = \frac{\$10{,}000}{\$5{,}000} = 2$$

$$\ln(1.10)^T = \ln(2)$$

$$T = \frac{\ln(2)}{\ln(1.10)} = \frac{0.6931}{0.0953} = 7.27 \text{ years}$$

What Rate Is Enough?

Assume the total cost of a college education will be $50,000 when your child enters college in 12 years. You have $5,000 to invest today. What rate of interest must you earn on your investment to cover the cost of your child's education?

About 21.15%.

$$FV = C_0 \times (1+r)^T \qquad \$50{,}000 = \$5{,}000 \times (1+r)^{12}$$

$$(1+r)^{12} = \frac{\$50{,}000}{\$5{,}000} = 10 \qquad (1+r) = 10^{1/12}$$

$$r = 10^{1/12} - 1 = 1.2115 - 1 = .2115$$

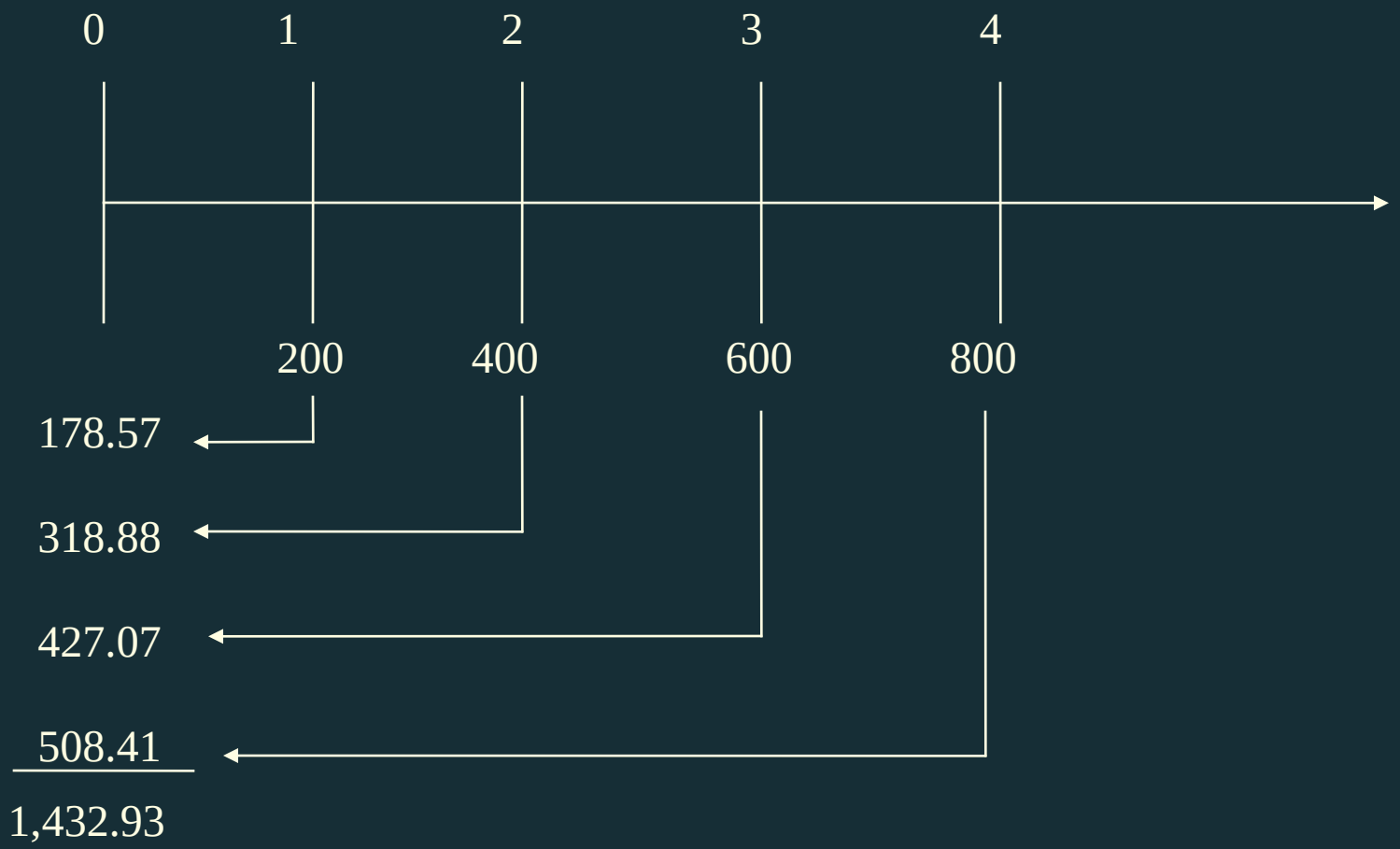
Effect of Interest Rate on Tail Heavy Cash Flow

Year	0	1	2	3	4	5	6	7	8	9	10
Cash Flow I	-10,000	3,000	3,000	3,000	3,000	3,000	4,000	4,000	4,000	4,000	4,000
Cash Flow II	-10,000	4,000	4,000	4,000	4,000	4,000	3,000	3,000	3,000	3,000	3,000

Multiple Cash Flows

- Consider an investment that pays $200 one year from now, with cash flows increasing by $200 per year through year 4. If the interest rate is 12%, what is the present value of this stream of cash flows?
- If the issuer offers this investment for $1,500, should you purchase it?

Multiple Cash Flows



Present Value < Cost → Do Not Purchase

Investing on a machine that lasts 4 years

	Year 1	Year 2	Year 3	Year 4	Year 5
Machine	20,000				
Annual Revenue		15,000	15,000	15,000	15,000
Annual Cost		3,000	3,000	3,000	3,000
Depreciation		5,000	5,000	5,000	5,000
Pre-tax Income		7,000	7,000	7,000	7,000
Net Income		0.8x7,000	5,600	5,600	5,600

Investing on an alternative machine that lasts 3 years

	Year 1	Year 2	Year 3	Year 4
Machine	15,000			
Annual Revenue		17,000	17,000	17,000
Annual Cost		4,000	4,000	4,000
Depreciation		5,000	5,000	5,000
Pre-tax Income		8,000	8,000	8,000
Net Income		0.8x8,000	6,400	6,400